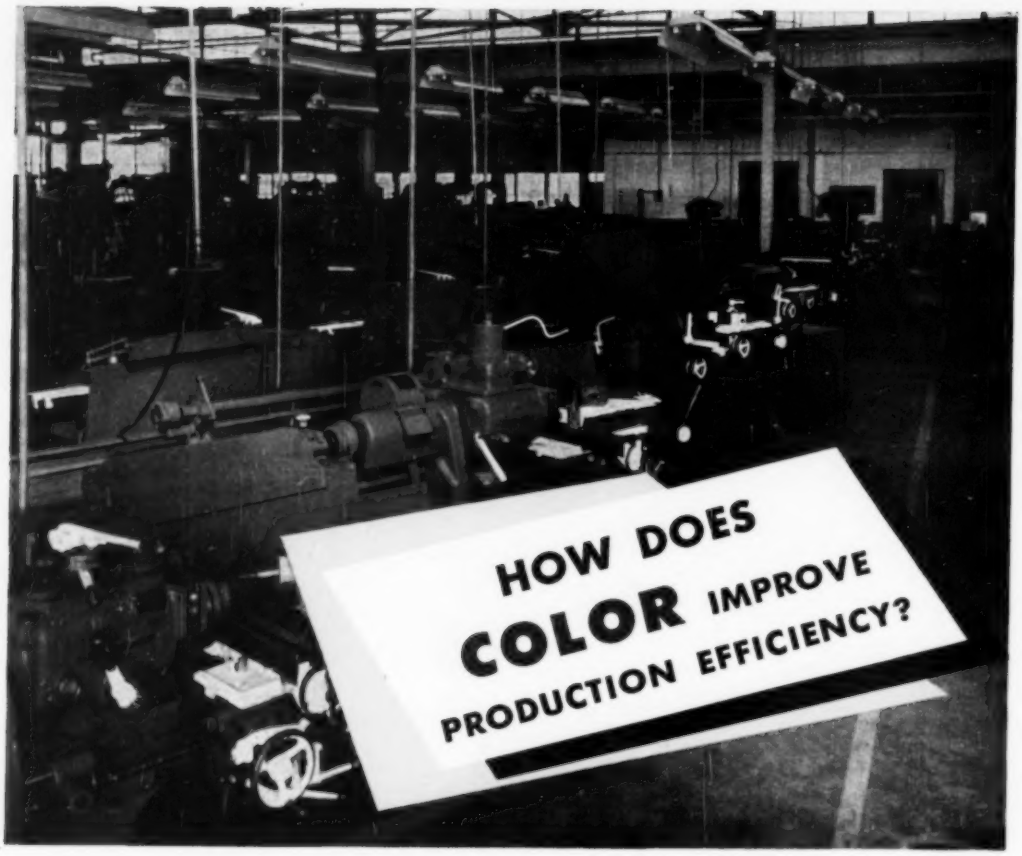
APRIL, 1949 Vol. 38, No. 4

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine



WHAT the skilled shopman of tomorrow knows must extend beyond metals, machines and methods. He will know how to use color properly to improve the quality and quantity of production.

He will know that the use of the right colors on machinery, walls and ceilings can result in *more work per man-hour and more man-hours per man!*

That's why many schools include Pittsburgh's COLOR DYNAMICS in their training courses.

In COLOR DYNAMICS, colors are classified according to their energy. *Focal* colors on machinery assist concentration. *Eye-rest* colors relax the eyes and nervous tension. *Morale-building* colors promote cheerfulness and restrain mental depression. *Safety* colors reduce accident hazards by warning workers of impending dangers.

COLOR DYNAMICS has been applied successfully in many leading plants. It is generally recognized as a distinct advance in production technique.

Begin now to teach COLOR DYNAMICS to your students. Send this coupon today for a free copy of our new edition of *"Color Dynamics in Industry."* Packed with convincing facts and practical suggestions, it is an excellent textbook for manual training and vocational education.

Pittsburgh Plate Glass Co., Paint Div.
Dept. IV-49, Pittsburgh 22, Pa.

Please send me FREE copy of your booklet on COLOR DYNAMICS.

Name _____

Street _____

City _____

County _____ State _____

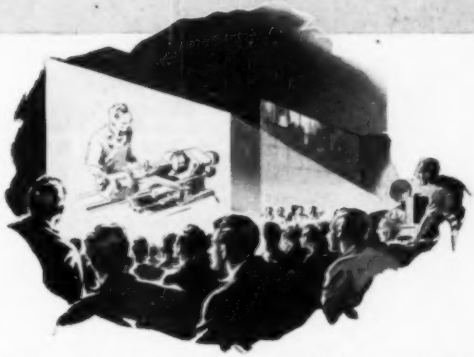
FREE BOOKLET!

PITTSBURGH PAINTS

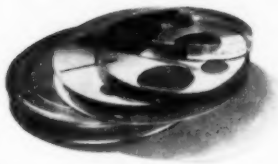
PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

Get These Teaching Helps on Lathe Operation



You can accomplish more in less time and with less effort if you use these books and films in your shop classes. They will help you make the work easier and more interesting. Their authenticity and effectiveness are attested by their extensive use in the better schools throughout the United States and at Army, Navy, and Air Force training centers.



FILM NO. I THE METAL WORKING LATHE

Introduces the student to the standard back-geared, screw-cutting lathe by familiarizing him with principal lathe parts, their names, purpose, and operation. Showing time, 20 minutes. 16 mm sound film in full color. *Free loan.*

FILM NO. II PLAIN TURNING

Teaches all basic operations used in machining a shaft held between centers. It shows the use of calipers and micrometers, locating and drilling center holes, selecting cutter bits, facing, rough and finish turning. Showing time, 20 minutes. 16 mm sound film in full color. *Free loan.*

FILM NO. III GRINDING and USE of BASIC LATHE TOOL CUTTER BITS

Shows how to grind correct clearance and rake angles on cutter bits for rough and finish turning, cutting off, and thread cutting. Tool adjustment and action of bit when taking a cut are also shown. Showing time, 20 minutes. 16 mm sound film in full color. *Free loan.*

HOW TO RUN A LATHE

The original and complete student handbook on the operation and care of metal working lathes. Describes latest shop methods and practices used by industry. Clearly written in simple, non-technical language . . . every student should have a copy. 45th edition. 128 pages — 360 illustrations. 25c per copy. *Free sample.*

MACHINE SHOP COURSE BOOK

This 32-page book contains drawings and instruction sheets for 12 practical projects. They range from simple articles for beginners to useful tools requiring considerable skill and experience to make. Drawings show all dimensions clearly. The instruction sheets guide the student step by step through all operations for each project. This book is widely used by leading vocational schools. 50c per copy. *Free sample.*

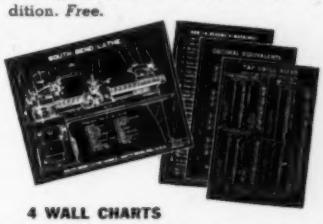
4 LATHE MAINTENANCE BULLETINS

Keep Your Lathe Clean — shows importance of protecting lathe from abrasive dirt. *Free.*

Oiling the Lathe — explains the necessity for adequate lubrication of the lathe. *Free.*

The Installation and Leveling of the Lathe — gives detailed installation and leveling information. *Free.*

Keep Your Lathe in Trim — tells how to keep the lathe in best operating condition. *Free.*



4 WALL CHARTS

These charts — "Principal Parts of a Lathe," "How to Become a Machinist," "Decimal Equivalents," "Tap Drill Sizes" — have been made especially for school use. 10c each. *Free samples.*

MODERN SCHOOL SHOPS

A 24-page booklet for shop instructors and supervisors on modern school shops and their equipment. Illustrates excellent installations in all types of small and large school shops.

CATALOG 100-G

Every shop instructor and supervisor should have this catalog. It illustrates all sizes and types of South Bend Quick Change Gear Lathes and Toolroom Lathes with 9" to 16" swings, and Turret Lathes with 1/2" and 1" collet capacities (9", 10", 16" swings), also numerous attachments and accessories.

How to Order

Sample copies of all printed teaching helps will be sent free upon request to school shop instructors or directors. Write for complete information on borrowing the South Bend motion picture films.

Building Better Tools Since 1906

SOUTH BEND LATHE WORKS

466 EAST MADISON STREET • SOUTH BEND 22, INDIANA

Now you can teach drill press techniques . . . *at portable drill costs* . . . with SKIL Drill Stand. It's a real break for your shop budget!

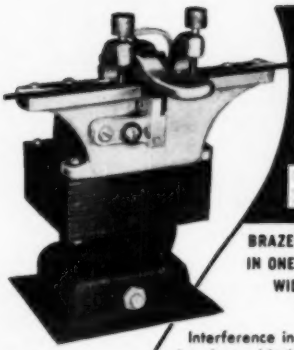
Combine SKIL Drill with SKIL Drill Stand and you're set for accurate, precision drilling and hole sawing. 20 to 1 leverage ratio makes SKIL Drill Stand ideal for even your youngest students. Base slots hold work firmly. Ground supporting column insures accuracy in any position.

Improve individual shop instruction. Ask your SKIL Tool Distributor to demonstrate SKIL Drill Stand *today!*

SKILSAW, INC.
5033 Elston Ave.,
Chicago 30, Ill.
Factory Branches in
Principal Cities
In Canada: SKILTOOLS, LTD.,
66 Portland Street, Toronto, Ont.

SKIL Tools

SKIL Tools are made only by Skilsaw, Inc.



ERWOOD
ELECTRO
BAND SAW
BRAZER

BRAZES BLADES UP TO ½" WIDE IN ONE OPERATION AND UP TO 1" WIDE IN TWO OPERATIONS

Complete with brazer, 6 ft. cord, plug, brazing material and fluxes. Shipping weight, 11 lbs.

ONLY
$19.75

Interference in class work due to broken band saw blades is eliminated with an Erwood Band Saw Brazer. It does the same repair work as brazers which cost nearly four times as much. The Erwood quickly pays for itself in less "down-time" on machines. It also permits additional savings resulting from making your own band saws from coil stock. It permits use of projects involving inside contour sawing.

The Erwood Brazer consists of high current transformer with two resistance electrodes arranged in clamping device. Built for 110 volt, 50-60 cycle operation or 220 volt, 50-60 cycle operation. Light in weight, it can be moved to any convenient position.

GUARANTEED TO GIVE COMPLETE SATISFACTION

See your dealer or write

The ERWOOD Company
DEPT. IAV • CRYSTAL LAKE, ILLINOIS

An UNBEATABLE VISE COMBINATION

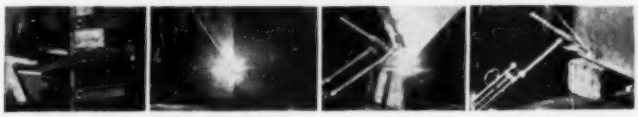
A new low cost woodworking vise — ideal for school-shop use. Made of best materials, light in weight, yet sturdy in construction.

MACHINIST VISE
Unsurpassed for Strength and durability. Supplied with stationary or swivel base and in various sizes.

CONTINUOUS SCREW AND QUICK ACTION VISE
Designed and built to withstand the most severe service. The extra heavy Cold Rolled Screw and Solid Nut will last a lifetime.

MORGAN VISE COMPANY
120 N. Jefferson Street — Chicago 6, Illinois

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, April, 1949, Volume 38, No 4. Published monthly, except July and August, by The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis. Entered as Second-Class Matter January 2, 1914, at the Post Office at Milwaukee 1, Wis., under the act of March 3, 1879. Subscription price in the U. S., Canada, and countries of the Pan-American Union, $3.00 per year; Foreign, $3.50; Single copies, 35 cents.



It Spot Welds! It Arc Welds! It Brazes! It Solders!

new!

5KVA SPOT WELDER and 120-AMPERE ARC WELDER in *One* COMBINATION UNIT

— both for considerably less than the usual cost of separate units!

DELTA "Dual Weld" Combination Welder

DELTA MILWAUKEE®

Now you need only a *single machine* to teach spot welding, arc welding, brazing, and soldering! Students can spot weld fine wire just as efficiently as 16-gauge steel and quickly change over to arc welding, soldering or brazing . . . all on this one machine.

The price for this dual-purpose Delta Combination Welder is considerably under that of an individual 5KVA spot welder and 120-ampere arc welder! That's due to Delta's unique design, careful engineering, and high production methods.

In industrial plants and in schools everywhere, low-cost Delta-Milwaukee Machine Tools have long been recognized as the finest machines available. Now you can give students (and yourself) the advantages of the same high Delta quality in welders.

Have your nearby Delta distributor show you this new Delta Combination Welder. Get a better idea of the many ways that you can use it in the classroom. Also see the new *Delta 5 KVA Spot Welder* and *Delta Portable Arc Welder*. And ask about deferred payments that suit your budget.

Send coupon for descriptive bulletin AD-453.

DELTA MANUFACTURING DIVISION
ROCKWELL MANUFACTURING COMPANY
MILWAUKEE 1, WISCONSIN

Look for the name of your Delta distributor under "Tools" in the classified section of your telephone directory.

For delivery in time for the Fall semester, specify Delta Welders on your requisition now!

No Other Welder Like It!

Look at these features:

- **One-Piece Welding Horns** — Eliminates inefficient electrical joints, reduces maintenance costs, provides maximum current for spot welding.
- **10" Throat Depth** — You can spot weld to the center of a 20" sheet.
- **Simple Contactor** — Provides easy operation and control of weld cycle.
- **Double-Insulated Coil** —Protects against burnout. Will not ground out or short.
- **Calibrated Current Scale**—Allows accurate job records to be kept for future reference on identical set-ups.
- **Wound Transformer Core** — Has extremely low watt-loss.
- **Full Spot Weld Pressure Adjustment** — Gives infinite control from minimum to maximum pressure — especially important for non-ferrous and extremely light jobs.
- **Infinite adjustment** of current throughout the full range of both spot and arc units.

Tear out coupon and mail today!

DELTA MANUFACTURING DIVISION
660D E. Vienna Ave., Milwaukee 1, Wisconsin

Send me free bulletin AD-453 describing the new Delta welders.

Name.....
Position.....
School.....
Address.....
City.....(.....) State.....

9-41

ATKINS *Silver Steel*

Bandsaws

Atkins "Silver Steel" Bandsaws help student and teacher alike to get off to a fast start. Because these saws cut clean and smooth, the student turns out creditable work right from the beginning. He acquires the craftsman's pride in fine workmanship, the eagerness to learn that makes the teacher's job so much easier. And Atkins Bandsaws are easy on school budgets, too. Made of famous "Silver Steel", they stay on the job longer, with fewer replacements.

ATKINS
Silver Steel SAWS

E. C. ATKINS AND COMPANY • Home Office and Factory: 402 S. Illinois Street, Indianapolis 9, Indiana • Branch Factory: Portland, Oregon
Branch Offices: Atlanta • Chicago • New Orleans • New York • San Francisco

"OLIVER" 18-inch BAND SAW

Most complete Band Saw of its size!

"Oliver" junior size Band Saws have many refinements and adjustments developed for larger "Oliver" Band Saws. Table measures 24" x 20" — heavily ribbed, accurately machined. Tilts 45° to right. Has miter cross-cut gauge and parallel ripping fence. Takes 9" under guide, 18" between saw and column. Rips to 11" wide, miters and cross-cuts to 6½". This ball bearing, motor-on-shaft Band Saw is precision-built to give years and years of smooth, dependable service.

"Oliver" also make 30" and 36" Band Saws for School Shops

•

Write for Bulletin No. 192-D

OLIVER MACHINERY COMPANY
Established 1890 GRAND RAPIDS 2, MICHIGAN

INDIVIDUALY TESTED
TO INSURE BETTER PERFORMANCE

IMPROVED Spring Clamp
In three convenient sizes

"C" Clamps
Openings 1 in. to 14 in.

Hand Screw
All popular sizes

Quick Clamps
Openings 4 in. to 5 ft.

No. 640 IMPROVED "I" Bar Clamp
Openings 2 ft. to 10 ft.

THERE IS AN INDUSTRIAL DISTRIBUTOR STOCK NEAR YOU

HARGRAVE
CLAMPS

• Hargrave Clamps have been constantly improved with the aid of skilled machanics to offer greater operating advantages and increased durability. Individually tested, they must be stronger, tougher and flaw-free. Made in openings from ¾ in. to 10 ft., from ½ in. to 16 in. deep.

WRITE FOR CATALOG showing the complete line of Hargrave Individually Tested Clamps, Chisels, Punches, Brace Wrenches, Star Drills, Washer Cutters, File Cleaners, etc.

Waverly & Main Aves.
Cincinnati 12, Ohio

HARGRAVE
Tested Tools
THE CINCINNATI TOOL COMPANY

PERFECT FOR SCHOOL SHOPS...

JUST RIGHT FOR SCHOOL BUDGETS!

Atlas 7" SHAPER

Only $355.00

F. O. B. KALAMAZOO — LESS MOTOR

- ★ PERFORMS EVERY SHAPING OPERATION WITHIN 7" STROKE.
- ★ TIMKEN TAPERED ROLLER BEARINGS, COMPLETE V-BELT DRIVE.
- ★ FOUR SPEEDS, FIVE AUTOMATIC CROSS FEEDS.
- ★ OVERALL DIMENSIONS 17" x 36" x 26" HIGH.

Send the coupon below for fully illustrated catalog of this unusual tool.

Shaper instruction is a valuable asset for any student today — particularly those who aspire to product engineering, or tool and die fabrication.

The Atlas shaper is the ideal machine for such instruction. It has all the operating versatility of large, expensive machines. Students can quickly grasp the operating fundamentals. It takes minimum floor space. And it is low in cost — operates from ½ HP 1725 RPM motor.

Four speeds, from 45 to 186 strokes per minute, and 5 automatic cross feeds from 3½ to 116 ft. per minute, gives you operating range for all types of metals. It handles horizontal, vertical, angular, dovetailing, internal cuts and keyseating.

SEND FOR FREE LITERATURE

ATLAS PRESS CO.
471 N. Pitcher Street
KALAMAZOO 13D, MICHIGAN

Name .....

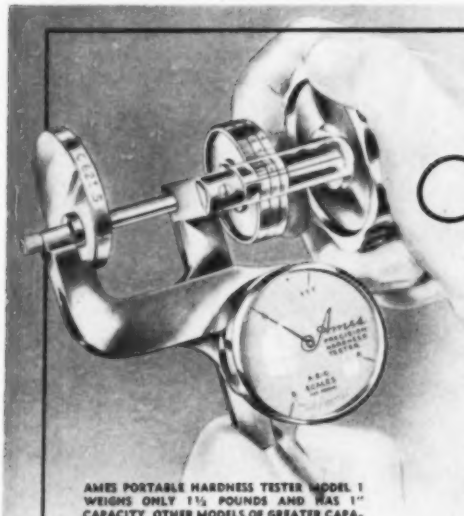
Address .....

City, State .....

ATLAS PRESS CO.
471 N. PITCHER STREET
KALAMAZOO 13D, MICHIGAN

Atlas POWER KING

MATCHED PRECISION TOOLS FOR METALWORKING AND WOODWORKING



AMES PORTABLE HARDNESS TESTER MODEL 1 WEIGHS ONLY 1½ POUNDS AND HAS 1" CAPACITY. OTHER MODELS OF GREATER CAPACITY. FURNISHED COMPLETE WITH BALL AND DIAMOND PENETRATORS, ANVILS, AND TEST BLOCKS, IN WOODEN CARRYING CASE, FOR TESTING DIRECTLY IN ALL ROCKWELL SCALES.

TEACH ROCKWELL HARDNESS TESTING IN THE CLASSROOM WITH

Ames PORTABLE HARDNESS TESTERS

All engineering students should understand Rockwell Hardness Testing of metals. It is an important subject which can now be taught in the classroom with Portable Hardness Testers.

They are light in weight, easy to use, durable and very accurate. Hundreds of them now used in industry. Students become familiar with hardness testing and many practical applications. Write for Hardness Tester booklet and complete information.

AMES PRECISION MACHINE WORKS

Makers of Precision Bench Lathes and Milling Machines

WALTHAM 54, MASSACHUSETTS

THE PROOF'S IN THE USE

RUBYFLUID FLUX

IS Better for All Soldering

Ruby's BIG $1 Sample — 1 pt. of liquid and ½ lb. of paste flux is more than enough to show you why we say Rubyfluid is a better flux.

- Rubyfluid —
  - Wets out freely . . .
  - Makes stronger neater joints . . .
  - Has no harmful fumes . . .
  - Acts quickly and saves time . . .

Ruby also will send you free its new booklet of simplified instructions on "How To Solder."

Write for the $1 Sample and Booklet Today

THE RUBY CHEMICAL CO.

77 McDowell St. Columbus 8, Ohio

Rubyfluid

WALLACE

"MACHINE-OF-THE-MONTH"

No. 11 UNIVERSAL SAW

Direct Gear Drive. Motor raises, lowers, tilts — table remains horizontal. Micrometer rip fence for fast set-ups and close work. Two mitre gauges, adjustable for accuracy and wear. Motors to 2 H.P.

Here's a variety saw with value *plus* — a precision unit for accurate work, with extra capacity for those hard-to-handle jobs.

It has power, speed, stamina. Blades up to 11" cut 4" deep. Cross-cutting capacity, 14". Ripping capacity, 12", 24", 36" or 48". Quality materials guarantee long, trouble-free service.

Write today for bulletins. We also manufacture high-grade bandsaws, jointers, cut-off saws, mortisers, lathes, shapers, grinders, etc.

J. D. WALLACE & COMPANY

140 S. CALIFORNIA AVE. CHICAGO, ILL.

NEW

11-inch SWING Logan LATHES

FOR THE SCHOOL SHOP

Designed and built for industrial use, these 11" Logan Lathes equip the school shop for a wide range of projects that keep student interest at a high level and provide a broad and thorough training.

They Have CAPACITY...

1" collet capacity, 1⅜" spindle hole, and center distances of 24" and 36" are indicative of the capacity for larger work these 11" swing lathes offer.

They're ACCURATE...

Precision preloaded ball bearing mounting assures sustained accuracy at any spindle speed from 45 to 1500 rpm. The two V-ways and two flat ways of their rugged beds are precision ground to a tolerance of .0005" along the lineal capacity of the lathe.

They're SAFE...

To protect inexperienced student operators, the countershaft, back gears, headstock, change gears and motor drive belts of these 11" lathes are all completely enclosed, yet easily accessible.

They're DURABLE...

Self-lubricating bronze bearings protect against wear at points where bearings are not ordinarily used. The lathes are ruggedly built throughout to withstand the stresses of school shop use with a minimum of maintenance.

They're A SOUND INVESTMENT...

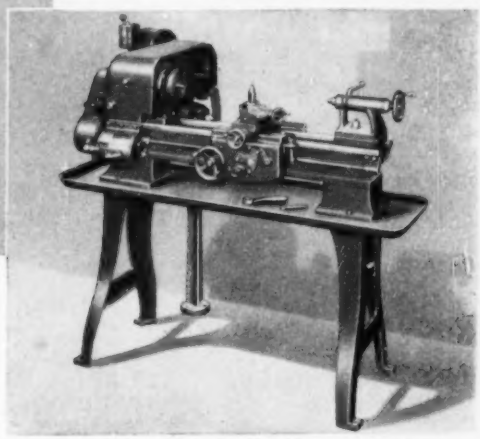
We know of no other lathe which offers the student and the school so much in accuracy and versatility for the price that Logan production efficiency makes possible.

WRITE FOR DETAILED INFORMATION ON ALL LOGAN 9", 10", and 11" LATHES AND 8" SHAPERS

LOGAN ENGINEERING COMPANY

4901 WEST LAWRENCE AVENUE • CHICAGO 30, ILLINOIS

Available in Bench, Floor, Cabinet and Turret Models

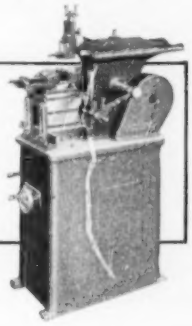


Logan 11" Floor Lathe. Quick Change Gears, 1" Collet Capacity, 1⅜" Spindle Hole, 24" and 36" Between Centers

Logan 11" Cabinet Lathe. Quick Change Gears, 1" Collet Capacity, 1⅜" Spindle Hole, 24" and 36" Between Centers

LOGAN 8" SHAPER

Combines extra capacity, wide speed range, smooth power and simple, low cost operation.



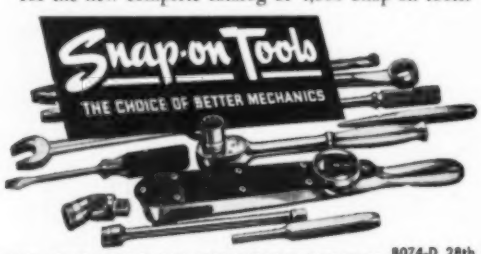
LOOK TO Logan FOR *BETTER* LATHES AND SHAPERS

ENCOURAGE
better workmanship . . . use modern
Snap-on Tools

Among the basic factors that determine the ability of a student to appreciate the importance of the job he is doing . . . is the quality of the tools you provide. Give him an unfinished, unbalanced, loose-fitting set of tools and you take away his appreciation of the job to be done.

Give him Snap-on tools, the choice of better mechanics, and he's ready with the right tool, the right size, strength, balance, feel, and fit to turn out a job that will be a credit to your teaching ability.

Snap-on offers you the services and counsel of tool experts, located in principal cities from coast to coast. Write for the new complete catalog of 4,000 Snap-on tools.



SNAP-ON TOOLS CORPORATION 8074-D 28th AVE. KENOSHA, WIS.

International Division: Kenosha, Wis., U.S.A.

ARMSTRONG
Drop Forged "C" CLAMPS

More Reliable . . .
Every characteristic essential to absolute reliability is built into Armstrong Drop Forged "C" Clamps — maximum strength, extreme stiffness, extra large Tempered and Tested Screws, better "Tool Sense" and design. That is why it is a good policy to standardize on Armstrong "C" Clamps . . . As one of the 9 major Armstrong lines your local dealer carries Armstrong "C" Clamps in "Heavy Duty", "Medium Service", "Extra Deep Throat", "Spatter Resisting" and "Toolmakers" designs, in a wide range of sizes.
Write for the New S-48 Catalog, just released.
"Heavy Duty"
"Tool Makers"
"Spatter Resisting"
"Extra Deep"
"Medium Service"

ARMSTRONG BROS. TOOL CO. CHICAGO 30, U.S.A.

new sander
PORTABLE ELECTRIC

STERLING **century** SANDER

Now! Low cost, fast, *safe*, easy sanding with the new Sterling Century. Sand wood, metal, slate, composition—desks, blackboards, lockers—all types of school maintenance work. Send for folder!

Vocational Instructors!
Acquaint your students with production and maintenance sanding. It's faster, easier, better!

STERLING STP

STERLING TOOL PRODUCTS CO.
1336-P Milwaukee Avenue, Chicago 22, Illinois
Canada: Terminal Warehouse, Dept. 35, Toronto 1.

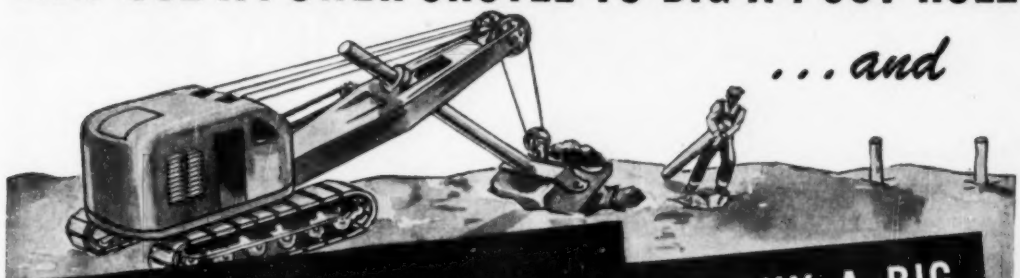
Send folder on New Sterling Century Sander

FIRM NAME _____

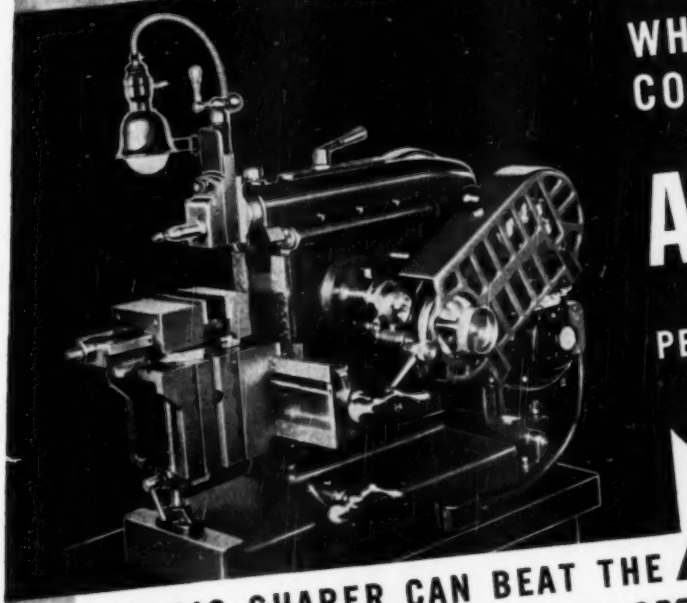
ATTENTION _____

STREET _____ CITY _____ STATE _____

WHY USE A POWER SHOVEL TO DIG A POST HOLE



. . . and



WHY BUY A BIG COSTLY SHAPER WHEN THE

AMMCO

WILL GIVE TOP PERFORMANCE UP TO

7"?

NO BIG SHAPER CAN BEAT THE AMMCO FOR *ACCURACY ☆ VERSATILITY ☆ SPEED ☆ ECONOMY*

The finest precision work with the very minimum of set-up time and results that will amaze you—that's what users of the AMMCO 7" Shaper report the world over. The AMMCO is not a "light weight" shaper, it's tough enough for the heaviest production schedule and perfect for all-around tool and die or shaping operations—it's the "precision machine of a thousand uses." It is available in bench or portable cabinet models. Write for a copy of our complete, illustrated catalog No. IA-548.

You can do it Better and Faster with AMMCO *Skill is Built into Every Ammco Product*

AMMCO TOOLS, INC. • COMMONWEALTH AVE. • NORTH CHICAGO, ILL.

Home Craft Sets are supplied either in the steel case illustrated or mounted on a panel which can be hung beside the lathe.

WILLIAMS

Home Craft

TOOL HOLDERS

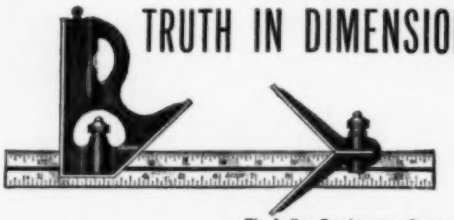
● This set of tool holders provides for all regular lathe operations and is ideal for school shop use on lathes from 7 to 10" swing. Drop-forged from tough steel, accurately machined and specially heat-treated, these holders represent the same fine quality as the Williams industrial line. The high-speed steel cutters furnished, are ground, ready for use except those for turning. The "diamond-point" turning cutters require only a minimum of grinding to desired form. Sold by Industrial Distributors everywhere. Write Dept. I-449 for descriptive literature.

J. H. WILLIAMS & CO.

400 VULCAN ST., BUFFALO, N. Y.

Stress the importance of

TRUTH IN DIMENSIONS



The Lufkin Combination Square

with **LUFKIN** Precision Tools

Placing these fine tools into students' hands is a good method of emphasizing the importance of accuracy of measurement. By so doing, you will help them acquire the same confidence which the name "Lufkin" has inspired in the minds of skilled craftsmen for more than sixty-five years. Write for free catalog.

The LUFKIN RULE Company

Precision Tools—Tapes—Rules

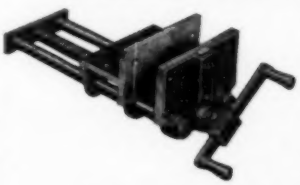
SAGINAW, MICHIGAN

New **Columbian 804 Steel Welded Workshop Vise**

With Handy Removable Pipe Jaws

The Columbian 804 Work Shop Vise is a rugged all-purpose vise of steel construction — fabricated by arc welding. Front and back jaws are welded from heavy steel. Screw and handle are cold rolled steel. Each Columbian 804 is finished in red enamel and packed in individual cartons.

Columbian Workshop Vise



★ Columbian Continuous Screw Woodworker's Vises are furnished with hard wood handles — or may be equipped with ADJUSTABLE STEEL HANDLES as above, to eliminate handle breakage, speed operation and provide extra leverage.

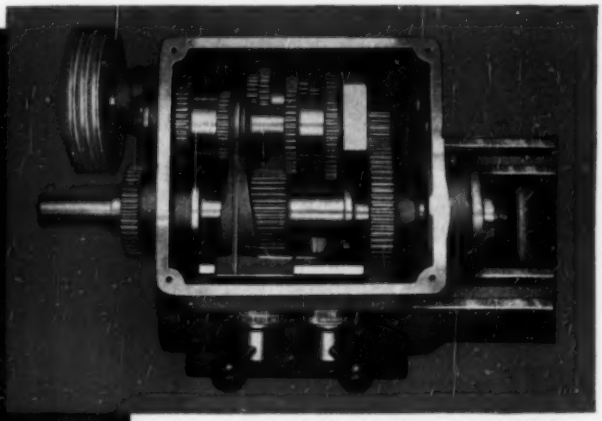
THE COLUMBIAN VISE & MFG. CO.

9022 Bessemer Avenue • Cleveland 4, Ohio

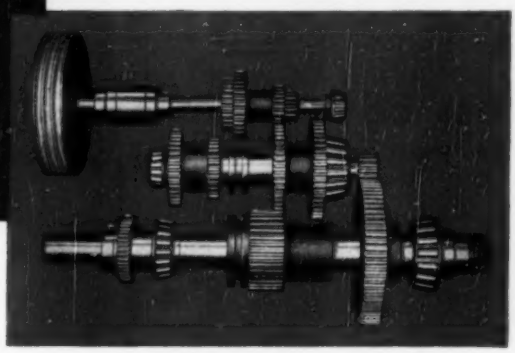
THE WORLD'S LARGEST MAKERS OF VISES

More Powerful Head

- ✓ Oversized Heat-Treated Steel Gears
- ✓ Timken Tapered Bearings
- ✓ Unusually Large Spindle, Rigidly Mounted
- ✓ Rugged Shifting Mechanism
- ✓ Extra-Heavy Casting
- ✓ Automatic Splash Lubrication



SEBASTIAN 8-SPEED GEARED HEADSTOCK
Interior view showing sliding gear transmission.



Timken Bearings and heat-treated steel gears on all headstock shafts assure more power, longer service life.

The above special headstock features assure more power, extra-high accuracy, and exceptionally low maintenance in the modern "King-made" Sebastian Lathe. In addition, the following features provide a superior ease and all-around efficiency of operation which make this *finer* Sebastian an outstanding leader in the medium-price engine lathe field:

Shaved headstock gears for quiet operation . . . Neutral point in head permits revolving spindle freely by hand for chucking work . . . Large hole through spindle . . . Headstock completely sealed . . . Multi-colored, direct-reading control dials for obtaining spindle speeds quickly and easily . . . Reverse in apron for feeds—adds to operating convenience . . . 57 feed and thread changes . . . Taper gibs . . . Apron control for start, stop, and reverse of lathe spindle (standard on lathes with 10′, 12′, and 14′ beds—also available on other bed sizes).

SEBASTIAN DEALERS ARE LOCATED IN PRINCIPAL INDUSTRIAL CENTERS

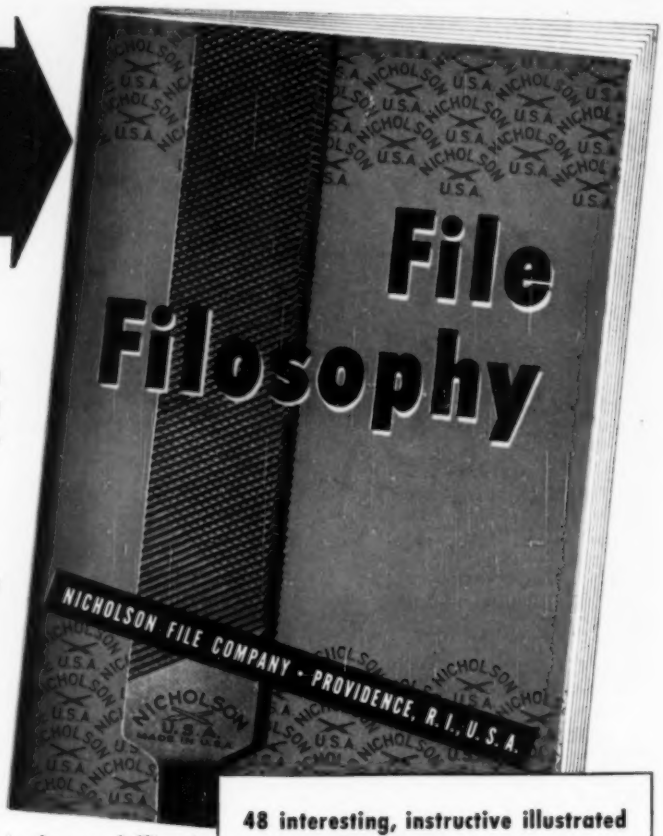
Sebastian GEARED HEAD LATHES
SIZES 12", 16", 20"

See your nearest Sebastian Dealer. Ask him or write us for Catalog S-1 (Standard Lathes) and S-101 (Special Type Lathes —Gap, Clutch & Brake, etc).

American Steel Foundries

KING MACHINE TOOL DIVISION
CINCINNATI 29, OHIO
Builders of King Vertical Boring & Turning Machines and Sebastian Lathes

NEW EDITION



FREE to school managements and instructors for library, classroom and school-shop uses . . . to supplement or replace worn old editions.

USE COUPON *(or school letterhead)* to request copies needed.

"FILE FILOSOPHY," a practical guide in the art of filing, has become universally accepted as an authority in its field; and sixteen editions with repeated printings have totaled nearly half a million copies — making it the most widely distributed book of its kind. Mechanical and technical experts have used it as a foundation for articles in the machinist and industrial press and for talks in the workshop and shop school. It is a recognized "textbook" in hundreds of mechanical training schools.

This latest edition is in up-to-the-minute form — with special thought given to modern industrial production and specialization. It reflects the leadership Nicholson holds as the largest and one of the oldest and most progressive file manufacturers in the world.

NICHOLSON FILE CO., Providence 1, R. I.
(In Canada, Port Hope, Ont.)

48 interesting, instructive illustrated pages. Subjects include:

- History and manufacture of files.
- File terminology.
- Filing methods and how to get the most out of files.
- Saw files and filing.
- Sharpening tools and implements.
- All representative regular-purpose files and rasps.
- *Swiss Pattern* files.
- Special-purpose files for *Brass, Lead, Aluminum, Stainless Steel, Foundry Castings, Die Castings, Die Making, Lathe Filing, Curved Tooth* and *Shear Tooth Filing.*
- The exclusive and radically different Nicholson *Super-Shear* and *Machinist's G. P.* Files.

NICHOLSON FILE CO., 47 Acorn Street
PROVIDENCE 1, R. I.

Send my copy of the new 1949 edition of "File Filosophy" to:

Name _____

Address _____

_____
(School and Title or Position)

NICHOLSON FILES *for every purpose*

Are You Planning to Attend Summer School?

The time is fast approaching when university campuses will be swarming with summer school students.

Are you going to attend? Have you chosen your school? If you have not, it is high time to spend some thoughts on it now. To assist you to come to a decision, the following schedules are listed.

More detailed information can be obtained by reading the advertisements which these institutions have placed in this magazine:

Bradley University, Peoria 5, Ill., will have two thirty-day terms, June 15 to July 21, and July 22 to August 25.

Colorado A. & M. College, Fort Collins, Colo., two four-week terms, June 20 to July 15, and July 18 to August 12.

Cornell University, Ithaca, N. Y., July 5 to August 13.

Oregon State College, Corvallis, Ore., June 20 to August 12.

The Pennsylvania State College, State College, Pa., June 27 to August 6.

State Teachers College, Oswego, N. Y., one six-week session, July 5 to August 12. Two four-week shop sessions, July 5 to July 20, and August 1 to August 26.

Special general-crafts workshop, July 5 to July 15.

The Stout Institute, Menomonie, Wis., June 20 to July 29.

University of Minnesota, Minneapolis 14, Minn. Two terms, June 13 to July 22, and July 25 to August 28.

University of Southern California, Los Angeles 7, Calif. Two terms, June 20 to July 3, and August 1 to August 27.

Wayne University, Detroit 1, Mich. Six, eight, or ten weeks, beginning June 27.

Institute for drafting teachers, August 1 to August 13.

This Month's Cover

The cover this month shows an apprentice receiving instruction on how to run the LeBlond No. 2 cutter grinder.

Photograph, courtesy of the R. K. LeBlond Machine Tool Company, Cincinnati, Ohio.

Coming Conventions

Apr. 16–17. Pennsylvania Industrial Arts State Conference, at California, Pa. Chairman, Dr. S. L. Coover, State Teachers College, California, Pa.

Apr. 19–22. New York State Vocational and Practical Arts Association, at Albany, N. Y. Headquarters, DeWitt Clinton Hotel. Convention chairman, Alexander C. Ducat, Albany, N. Y.

Apr. 21–23. Michigan Industrial Education Association, at Grand Rapids, Mich. Headquarters, Civic Auditorium. Secretary, Ward Sager, Central Michigan College of Education, Mt. Pleasant, Mich.

Apr. 21–23 (tentative). West Virginia Industrial Arts Association, at Jackson's Hill, W. Va. Chairman, Wm. B. Conley, Raleigh County Vocational School, Beckley, W. Va.

Apr. 28–30. Indiana Industrial Education Association, at Marshall, Ind. Headquarters, Turkey Run Inn. Secretary, H. G. McComb, 215 State House, Indianapolis, Ind.

May 5–7. Wisconsin Association for Vocational and Adult Education, at Milwaukee, Wis. Headquarters, Hotel Schroeder. Secretary, C. D. Rejahl, 114 N. Carroll St., Madison 3, Wis.

May 12–14. American Industrial Arts Association, at St. Louis, Mo. Headquarters, Hotel Jefferson. Exhibits in charge of J. Ely Van Hart, 1117 Kipling Road, Elizabeth 3, N. J.

VOL. 38, NO. 4 APRIL, 1949

Industrial Arts and Vocational Education

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

THE BRUCE PUBLISHING COMPANY
540 NO. MILWAUKEE ST., MILWAUKEE 1, WIS.

CENTRAL OFFICE: 20 N. WACKER DRIVE, CHICAGO 6, ILL.
EASTERN OFFICE: 330 WEST 42ND ST., NEW YORK 18, N.Y.

TABLE OF CONTENTS

Technical Institutes ..... *Ralph E. Pickett* 137
Selecting an Institution for Graduate Study ..... *William T. Bawden* 141
What the Supervisor of Printing Should Expect of His Staff ..... *Leroy Brewington* 144
The Present Position of Industrial Arts in Canadian Schools ..... *Lindley H. Bennett* 146
Guidance in the Industrial-Arts Shop ..... *Alice Helen Frankel* 150
Editorials 152
Aiding the Diversified Occupations Student to Adjust to His Job ..... *William P. Green and Benjamin J. Novak* 154
Selling the Graphic Arts ..... *John M. Fontana* 156
Some Statements Prepared for the Vocational Teachers of Hesse, Germany ..... *Homer J. Smith* 157

Problems and Projects

Simple New England Wall Sconces ..... *Vincent P. Conners* 159
Instrument Cabinet for the Drafting Room ..... *F. N. Newton, Jr.* 159
Letter Rack ..... *P. S. Burns* 161
Indian Silversmithing ..... *Ben Hunt* 162
Plastic Mirror With Ornamental Back ..... *Simon S. Palestrant* 163
Less Light Required 164
A Machinist's Vise ..... *D. E. Kellogg* 164
Solvent Illness 169
Cheese and Cracker Tray ..... *Harry S. Baldwin* 169
Basic Styles in Popular Type Faces ..... *R. Randolph Karch* 170
A Heavy Duty Tablet Arm Chair ..... *George H. Parkes* 170
Hand and Machine Die Holder ..... *Ira H. Johnson* 173
Two Dimension Plate Centering ..... *B. Alfred Cox* 174
Blueprint Machine ..... *H. R. L. Chellman* 174
Economy Plug-In Devices ..... *Elmer C. O'Donnell* 175
Stock Rack for Metal and Machine Shops ..... *Norman Peterson* 176
An Aid for Reading Data ..... *R. E. Murray* 176
Personalized Tie or Belt Racks ..... *Delmar W. Olson* 177
Some Factors in the Teaching of Shop Mathematics ..... *W. H. Edwards* 178
Mug ..... *Clifford L. Yard* and *Henry J. Kaufman* 178
Modern Iron Furniture ..... *Carson F. Thomson* 180

Association News 16A
Personal News 23A
Shop Equipment News 25A
New Publications 30A
News Notes 32A

Entered January 2, 1914, as Second-Class Mail Matter at Milwaukee, Wis., under Act of March 3, 1879.
Copyright, 1949, by the Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, November 25, 1930.
Published monthly except during July and August.

Subscription Information. — Subscription price in the United States, Canada, and countries of the Pan-American Union, $3.00 per year, payable in advance. Postage, foreign countries, 50 cents. Copies not over three months old, 35 cents; more than three months, 50 cents.

Discontinuance. — Notice of discontinuance of subscription must reach the Publication Office in Milwaukee, at least fifteen days before date of expiration. Notices of changes of address should invariably include the old as well as the new address. Complaints of nonreceipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

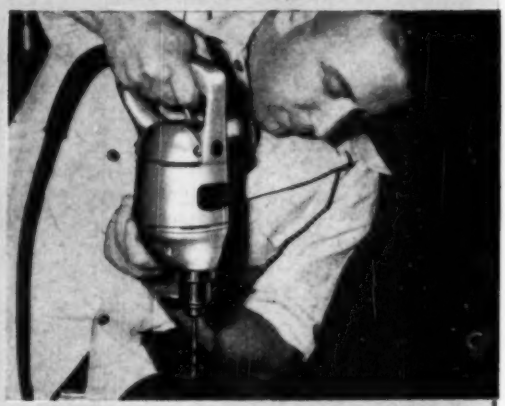
Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

for Faster, More Efficient Training . . .

1/4" JUNIOR DRILL—For Light, Intermittent Drilling and Odd-Job Use $28.00

1/4" HOLGUN* — For Light Gage Metal Production Assembly Work $38.00

1/4" STANDARD DRILL—For Maintenance and Medium Production Work $44.00



1/4" HEAVY-DUTY DRILL — For Heaviest, Continuous Production Drilling $50.00

Buy Black & Decker Electric Drills . . . and you're sure to get the *right* Drill for *every* training requirement! Nowhere else can you find the wide selection of models (25 in all, from 1/4" to 1 1/4" capacity) . . . the unmatched quality construction that means extra years of service despite unskilled handling . . . famous full-power Black & Decker-built motors that *can't be stalled* . . . a choice of speed and handles!

These FOUR 1/4" Drills are an example. Each is designed for a particular type of application. Each gives you the most for your money in its class! Call your nearby Black & Decker Distributor today for free demonstrations of the many B&D Portable Electric Drills, *the world's most complete line!* Write for detailed catalog to: The Black & Decker Mfg. Co., 680 Pennsylvania Ave., Towson 4, Maryland.

*Trade Mark Reg. U. S. Pat. Off.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

SANDERS

BENCH GRINDERS

SAWS

SCREW DRIVERS

-IAVE-
APRIL . . . 1949

Technical Institutes

RALPH E. PICKETT
Associate Dean
School of Education
New York University
New York, N. Y.

Many people who have only recently noted the news items about technical institutes think of them as brand new agencies born of World War II. In a vague way the whole field of technical education seems to them to be relatively new, largely because they remember hearing and reading so much about technology before, during, and after that war. Yet the broad field of technical education has a history that predates even World War I. Indeed, those of us who remember the news items before, during, and after that first global conflict found something more than faintly reminiscent in the more recent news items.

One of the greatest services done for technical education has been the series of annual surveys of technical institutes prepared by Leo F. Smith, Educational Research Office, Rochester Institute of Technology, and published by McGraw-Hill Book Company in Technical Education News. The first one appeared in the special June, 1945, issue and succeeding ones have appeared in June of 1946, May of 1947, and May of 1948. In the first one, Smith used the following definition:

Technical Institute Programs

"Technical institute programs are essentially technological in nature and intermediate between those of the high school and the vocational school on the one hand and the engineering college on the other. Curricula in this field are offered by a variety of institutions and cover a considerable range as to duration and content of subject matter, but have in common the following purposes and characteristics:

"1. The purpose is to prepare individuals for positions auxiliary to, but not in, the field of professional engineering.

"2. Curricula are essentially technological in nature, based upon principles of science, require the use of mathematics beyond high school, and emphasize rational processes rather than rules of practice.

"3. Curricula are briefer, more intensive, and more specific in purpose than collegiate engineering curricula, although they lie in the same general fields of industry and engineering. Their aim is to prepare individuals for specific technical positions or lines of activity rather than for broad sectors of engineering practice.

"4. Training for artisanship is not included within the scope of education of technical institute type.

"5. High-school graduation or the equivalent is required for admission."

That first survey classified technical institutes under the following four headings: (1) State and municipal, (2) Privately endowed, (3) Proprietary, (4) Maritime Academies and Federal, and showed a total enrollment in the 93 institutions replying, of 10,020 students in 1940–41 as against 10,538 day students and 8337 evening students, grand total 18,875 in 1944–45. Another classification of YMCA schools was added in 1945–46, when from 74 institutions replying, registration figures showed 10,777 total day students and 7879 total evening and special students, grand total 18,656. Still another classification of Extension Divisions of Colleges and Universities was added in 1946–47, when from 77 reporting institutions figures were obtained of 29,130 day students, 20,305 evening and special students, grand total 49,435. Those six divisions were used again in 1947–48, when 82 schools reported a total of 30,927 day students, 16,714 evening and special students, grand total of 47,641.

The reader is warned against any hasty conclusion from these few summary figures. While it is true that in the last year five more institutions reported, yet the student body declined almost 2000 in number, there are too many factors involved to justify the easy assumption that the demand for this education is waning the while we continue to establish more schools. It must be remembered that these figures are only from the institutions that *reported* each year. Furthermore, consider that in 1944–45 there were 5550 day students reported from maritime academies and federal schools whereas in 1947–48 there were only 821 students reported. Consider further that proprietary institutions in 1944–45 showed 2205 day students, 1544 evening students, total 3749 whereas in 1947–48 the figures were 16,783 day students, 2807 evening and special, total 19,590. A study of the complete surveys for each year will cause one furiously to think although many different conclusions may be reached. It is part of the purpose of this article to suggest certain lines along which we may profitably lead our thinking.

Had all the states of the union established technical institutes before the end of World War II it is conceivable that much of the pressure placed upon existing colleges by the returning G.I.'s could have been relieved. If the technical curricula had been diverse enough, many veterans who didn't want a traditional college education, but who entered a traditional college solely because they couldn't get into a more suitable institution, would have been much happier and better off in a technical institute. Surely many of the weaker private schools that spring up like mushrooms to cater to veterans who wanted technical training would not have been started had there been adequate provision in publicly operated technical institutes. One could also surmise that had there been a good nationwide system of technical institutes established after World War I the problem of supplying a sufficiently large number of technically trained people for World War II would have been much less acute. (Are some readers asking themselves: "Will we learn in time for World War III?")

Technical Education Must Be Flexible

Technical education has a unique place to fill in our total educational picture. Probably no other type of education could be expected to be more flexible since it is supposed to be sensitive to the fields of science and technology. Every significant advance in those fields could presumably be the reason for a change in some portion

of the technical education program either by an addition of a new curriculum, a dropping of an archaic one, or a modification of an existing one. Flexibility and sensitivity should be watchwords. Certain technical schools have taken pride in their responsiveness to technical change and have tried to have at least some of their curricula attuned to such change. Other schools, particularly the proprietary ones, have realized that a close coupling of their curricula to the world of technology can mean the difference between continuing a life of educational usefulness or falling into the hands of the sheriff. It is because of that need to stay attuned that most technical schools have advisory boards of one sort or another. Some boards are widely representative and function vigorously, some are less vigorous and are more narrowly selected.

There are many kinds of technical institutions, as can be gathered from the earlier listing of categories. A breakdown of each category by titles of schools would show the differences even more strikingly. Many different curriculums are offered by the schools in Smith's lists and additional curriculums are offered by the schools not included for one reason or another in Smith's surveys. Some curriculums are short, intensive, and based on the minimum of general and specific education needed for efficiency in a particular occupation. Others are one, two, three, and even four years in length. There is some criticism of the very short curriculums by some proponents of the longer curriculums on the ground that such short intensive training smacks too much of the hurry-up type of narrow vocational training. In turn some of the longer curriculums have been criticized for unduly prolonging a student's stay in school and as being thin imitations of engineering curriculums. Such differences in points of view are to be expected. It would be a matter of real concern if no internal criticism existed. Internal and external questioning should be welcomed if thereby improvements can be effected or retrogression prevented.

Types of Technical Institutes

There is enough in the foregoing to justify certain comments and questions applicable for the most part, but not solely, to those technical institutes offering only curriculums that require a fixed number of years, usually two, for completion. It should not be necessary to emphasize that the pioneers who worked so hard to establish these institutes envisioned an agency that would be open to high school graduates but that would not encroach upon the domain of existing engineering schools. Roughly, this means that the curriculums of existing secondary-level technical schools or departments are not to be duplicated by the technical institutes nor are the curriculums of the engineering schools to be duplicated. This means further of course, that the technical institutes should not be competing for students with secondary schools on the one hand nor with colleges of engineering on the other.

It seems reasonable to suppose that after the bulge of veteran students subsides the technical institutes, wherever they may be located in our country, will be in a position to re-evaluate their policies and practices. This is in line with the avowed intention of many of the other postsecondary institutions to reappraise their own policies and practices if the pressures of the past few years ever lighten. At the present moment the free full-time day curriculums are marvelously attractive and the desire or necessity to get out in a hurry is not so great as it may be if the economic picture begins to show a significant change. Students who today can view with equanimity a sojourn in the technical institutes of a fixed number of years may be replaced in the future with students who will be desperately anxious to get trained in a hurry so as to get a job as soon as possible. Not that a degree of urgency does not today affect certain students — they are found in virtually every college in the land — but rather that a time might come when urgency will be the rule rather than the exception. A clamor will then arise for the abandonment of curriculums whose time limits have been arbitrarily set at any fixed number of months or years. Of course if another real depression were to come, which God forbid, the tendency could easily reverse itself and the movement would grow to keep students in school and out of the labor market as long as possible. The pressure to establish shorter curriculums will probably be exerted first by those more mature people who are employed during the day and who attend technical institutes at night. Wherever such people have to pay fees for their nighttime courses in technical institutes the pressure will be intensified by the competition from privately operated schools. Such schools have usually been much quicker in the past to adjust their offerings to changing economic conditions than have been the public schools.

Privately operated proprietary schools have also claimed that they have been much more sensitive to changes in technology and that hence their training is not only more direct but also more accurately reflective of actual needs and conditions. It is not the purpose of this article to take sides in any such controversy or even to initiate one. It is in order, however, to suggest the wisdom of taking stock of a situation. A progressive institution stays progressive by a process of continual appraisal and reappraisal. All of us are acquainted with agencies that started out with an opportunity no more golden than that which has been facing the technical institutes, and with intentions just as good, only to allow stagnation and crystallization to take place. After a period of easy living with full classes of docile and not too impatient students for whom jobs can easily be obtained, a faculty can convince itself that what it is teaching is exactly right. Indeed, some faculties might resent bitterly any attempt to change content or method. The staffs of some technical institutes are aware of this danger and have themselves taken steps to meet the problem.

Technical Institute Curriculums

This is only one of many problems that will face the heads of these institutes and their staffs in the years immediately ahead. In the scope of this brief article it is impossible to cover all the problems or to do full justice to any one of them. However, some of the high spots of problems that have been encountered here and there over the country, and of possible solutions, can be given. There are reasons why at this time certain technical institutes want to offer only curriculums that are one or two years long or some other arbitrarily fixed length of time. But it would be hard to justify such arbitrarily set time lengths on the basis of any research evidence that occupational competency requires exactly those lengths for all curriculums offered and for all students.

In this connection it is interesting to look over the results of the analysis of the curriculums of the institutions that reported to Leo F. Smith for his 1945–46 survey. His article in the October, 1946, issue of *Technical Education News* is most illuminating. He closes his article with six generalizations of which the following are first and second:

"1. There appears to be a movement on the part of the state maritime academies and the U. S. Merchant Marine Corps to give four-year college courses.

"2. In all, a total of 180 different curriculums were reported. Of these, 138 were in engineering and technological fields, 16 in agricultural, 13 miscellaneous, 6 in graphic arts, 4 in home economics, and 3 in health services."

He states further that: "courses in aviation and radio accounted for 69 per cent of all the curriculums reported by these (proprietary) schools." Do we sense all of the implications of that fact? With a heavy preponderance of curriculums in engineering and technological fields it is almost in-

evitable that a steady lengthening process will take place. Are the consequences of such a possibility fully understood? In the surveys reported by Smith, those technical institutions that became junior colleges were excluded in succeeding years presumably because they were heading toward degree-granting curriculums. Will the maritime academies be later excluded? Will those remaining institutions that go to four years be dropped if they undertake to grant a degree? Will the movement work in reverse also so that all institutions that offer shorter curriculums will be dropped too?

Short or Long Courses

As the technical institutes grow in usefulness they will undoubtedly want to become more functional and that will mean that they will establish terminal curriculums of varying lengths to meet specific training and employment needs. Any legislative impediments to establishing such shorter curriculums which may exist will be removed as soon as there is a strong demand for such shortening. There may still be need to operate the longer and less specific curriculums, especially if the technical institutes ever act as feeders to four year colleges, of which more anon; but there is no reason why short and long curriculums cannot still be operated within the one institute, given space, facilities, staff, willingness and know-how.

The value of such short curriculums will be directly proportional to the fidelity with which they reflect the actual training needs. Herein lies one of the greatest challenges. All agencies that hope to train for specific occupational efficiency have been so challenged, but how many have met that challenge perfectly? Perhaps perfection is too much to expect; but surely in a country that is as advanced as we are, we ought to be able to devise a satisfactory method for finding out exactly what should comprise the curriculum for each occupation for which we provide training and for keeping the information up to date. A number of studies have already been made which make it clear that as far as essential techniques, procedures, operations, skills, and knowledges are concerned the range is tremendous. For some types of work unbelievably small amounts are necessary, far less than we have been providing; for others perhaps more than our students have been given. Too frequently we have been willing to disregard the results of such studies and to continue with our easily administered curriculums that follow the standard pattern of so many months or semesters or academic years. That means that we have usually padded our curriculums to meet traditional concepts of content and time.

A starkly realistic meeting of this challenge probably would demand that we include nothing in such curriculums that cannot stand rigorous tests for demonstrated needs according to certain criteria. The following are suggestive questions we might ask about the graduates of these curriculums, i.e., have the graduates acquired: (1) all the techniques, operational procedures, skills, etc., that they will need on the job within a reasonable time after starting to work? (2) all the knowledges related to those techniques, operational procedures, skills, etc., essential to a correct and understanding performance? (3) the correct attitudes toward work, fellow employees, foremen and supervisors, etc.? (4) the habits, knowledges, and attitudes of a good citizen of our times? (5) at least the minimum of general education *necessary* to make (1) through (4) possible? (6) such additional general education as is consonant with the level of the occupation (if such a thing exists), the needs of society, and the individual's desires and abilities?

Suggestive Criteria

The analytical techniques which have been developed since the days of Charley Allen are refined enough to give us good material for (1) and (2) if we really want that information. A great deal of analysis has already been done but certainly, in a fast moving field like technical education, analysis to be completely valid must be revised as frequently as significant changes in technology occur. We have not gone as far in (3) as we should. Admittedly the job is harder, and concord of opinion is more difficult to obtain, especially with differing concepts of what constitutes proper attitude these days. Would anybody deny that the attitudes of the worker toward his job, his boss, his union, to mention only three, are vastly different today than they were a generation ago? The attitudes of employers have changed too, and will continue to change as will those of employees. The task of instilling proper attitudes, although hard, is not impossible; but before it can be attempted there must be a reasonable meeting of minds on what constitute the proper attitudes.

I confess I am doubtful of the validity of the findings of any analyses dealing with (1), (2), and (3) that do not grow out of the concerted and continuing efforts of employees, employers, and educators. No one of these groups can do an adequate job alone. A joint effort will require patience, sympathetic understanding, mutual respect, and compromise; but the results would justify the effort. In some places and for some lines of work such procedures have been in existence and to good effect; but for all vocational curriculums such procedures should be the inviolable rule and not the exception. Once started they should be continued year after year to check on existing curriculums, to revise them when necessary, and to devise new ones for new lines of work. The cost of keeping competent analysts at work would be great, but not greater than is the cost of continuing to teach outmoded content by outmoded methods to too many or too few students. Our concepts of how many to train for any given occupational field have varied with the times. When there are more jobs than there are applicants few people want to hear about future overcrowding; when jobs are scarce few people are willing to look ahead to the evils that undertraining will bring about. One of these days we ought to treat such problems in an adult fashion and not let ourselves be unduly swayed by overoptimism any more than by ultrapessimistic hysterical outbursts.

In all probability, suggested criterion (4), the habits, knowledges, and attitudes of a good citizen of our times, would find as many differing opinions as would number (3). That should not deter us from attempting to get some measure of agreement. I have frequently marveled at our bland assumption that everybody knows what constitutes good citizenship, and that hence all teachers are teaching good citizenship. Recent events have cast doubt on that assumption with dramatic forcefulness. Is it not about time that those of us who value our citizenship become concerned that the generation currently in schools be given the training in genuine citizenship that is most suitable to their years? How can that training possibly be given unless we reach some agreement as to what we mean by genuine citizenship these days, and how best to achieve it? And yet how absurd to let our school population grow up with any portion or their training in citizenship left at all to chance! It is bad for all of the students, but perhaps especially bad for those going into the scientific and technological fields.

Suggestive criteria (5) and (6) will probably give rise to much anguished controversy among some educators who read this article. Before the lid blows off let me call attention to the wording: (5) at least the minimum of general education *necessary* to make (1) through (4) possible; (6) such additional general education as is consonant with the level of the occupation (if such a thing exists), the needs of society, and the individual's desires and abilities. I am not an advocate of what some call a narrow vocational preparation with little

or no general or cultural education. I am an advocate of calling things by their right names. I object to a curriculum being loaded with pet subjects under the guise that they are *necessary* for the student to acquire techniques, knowledges, attitudes, etc. There has been overwhelming evidence that for many vocations the amounts of general education *necessary* for acquiring the techniques, knowledges, and attitudes and for successful performance on the job are astonishingly small. And yet we keep on insisting that the heavy doses of general education in those curriculums are *necessary* for acquiring the vocational aspects. I contend that we should make a distinction between what is necessary on the one hand, and on the other hand what is desirable, perhaps, or requested by somebody in authority or pressured into the curriculum or inserted to keep people in school longer in a depression or retained merely through tradition or inertia or to get students into a higher institution or because the school authorities honestly believe that they are providing the best sort of vocational preparation through these general subjects, etc.

There is hardly an institution in the land that does not have its own peculiar ways of rationalizing the retention of some portions of some of its curriculums on the grounds of necessity. Maybe everything that is being taught everybody is just as it should be, but I doubt it. Maybe if we did make a distinction between necessity and some other reason, the curriculums would remain just as they are; but if so, we would have to admit that if we prescribe four terms of a subject when only one is really needed the other three terms are there for some reasons beyond necessity. If we ever do go completely realistic in such a differentiation many vocational curriculums are going to undergo some startling changes. Here again the need for competent representatives of employees and employers to work with educators is manifest.

If in devising the curriculums of technical institutes these competent representatives all agree upon what is *necessary* and thereafter agree that over and above what is necessary there is to be arbitrarily added further general education for the presumed good it will do the students, then everybody will know what the score is. The principle is, I think, important. Furthermore, one of these days we may be called upon to demonstrate (demonstrate — not merely assert) how much good will accrue to the student from further general education. This should keep us on our toes and no educator should object.

Within measurable time, the pressure to make the technical institutes into four-year degree-granting colleges will arise. Perhaps this pressure will be resisted, but one can think of many reasons and situations which will make resistance difficult. The point might be made that when many of our present two-year technical institutes become four-year schools they may look strangely like the old four-year engineering colleges. Maybe at that time we'll try to rationalize the situation and claim that society again needs such schools. I submit that such a development is not telic but Topsy-like. We have had too much of unplanned development and unexpected results all through educational history. Whether we have rushed or drifted into the situations that produced the bad results is immaterial.

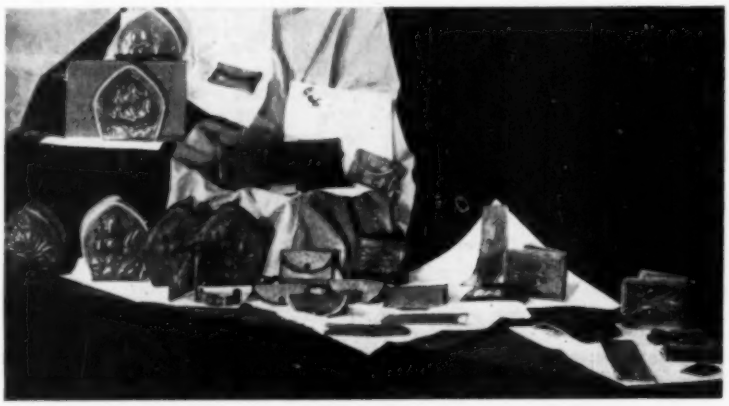
It should not be necessary from now on to have to add a third and then a fourth year to existing two-year technical institutes to provide for the student who wants a degree. There should be no dearth of degree-granting institutions that will welcome the graduates of the two-year technical institutes and without too great a sacrifice of academic credits either. Already some satisfactory dual curriculums have been worked out and others are in process. Due recognition can be given to the training obtained on a co-operative basis — many degree-granting schools have long had their own co-operative programs — and proper allowance can be made for the many hours of laboratory work covered. Even the short unit courses that some technical institutes offer can be evaluated toward a degree if there is a willingness to consider the problems broadly instead of narrowly.

Well here we are at the end of this article and we still have a number of problems left untouched — interesting ones, too, such as selection of students; selection, preparation, and upgrading of teachers; salaries; administration and supervision; placement; publicity and public relations; equipment; cooperative training; and on and on even to the problem of whether our students are really being taught the real facts of life. But one has to keep within the limits set by the editor. That is also a fact of life. The technical institutes have survived the doldrums of the war years that saw the demise of some and the near extinction of others. They have lived through the greatest period of expansion in their histories. Unless all signs fail they will have to face some changed conditions in the next year or so that could easily mean for some the loss of most of the postwar gains and for others sheer disaster. The alert institutions, those that consider service to the student as paramount, those that keep closely in touch with real social and technical needs, will come strongly through any readjustments. Are not such institutions the ones that have a history of survival through service?

"Describe a bolt and a nut," a certain high school quiz demanded.

"A bolt is a thing like a stick of hard metal such as iron with a square bunch on one end, and a lot of scratching wound around the other end. A nut is similar to a bolt only just the opposite, being a hole in a little square of iron sawed off short, with wrinkles around the inside of the hole."

Vehicle mileage in 1948 is estimated at 7 per cent above 1947 and 19 per cent above 1941. The traffic death rate per 100 million vehicle miles was estimated at 8.1 — the lowest rate on record. — *National Safety Council.*



Leathercraft projects made by the summer-term students at Northeast Missouri State Teachers College. Photograph by Kenneth Sykes. Submitted by Roland F. Nagel, instructor

Selecting An Institution For Graduate Study

WILLIAM T. BAWDEN
Director of Publications
Kansas State Teachers College
Pittsburg, Kans.

Each year a number of men in the fields of industrial arts and vocational education give serious consideration to the problem of further self-improvement through graduate study. These individuals observe all about them evidences of the demand for higher qualifications for teachers, even though the salaries offered do not always correspond. Teachers of shopwork and drafting understand that standards of professional preparation and personal attainment are gradually but surely rising. In filling certain types of position of responsibility and influence, the list of candidates now is practically, if not officially, limited to those who have demonstrated capacity for superior accomplishment by earning the higher degrees through postgraduate study.

The problem comes to you, the individual shop teacher, in the form of questions such as these: How can I find out whether I have the necessary ability to make good in, and to profit by, graduate study? Having found a satisfactory answer to this question, how shall I select the institution?

Why Go to the Graduate School?

Another question, asked less frequently, but equally if not more important, is: Just why should I spend time, money, and effort in graduate study?

The motive which actuates you in enrolling for graduate study is more important than some other considerations, for it is in terms of what you expect to accomplish that you will evaluate the results. In some city school systems and in some institutions of higher learning, the salary schedules provide that permanent increases in salary follow the attainment of the master's degree and the doctor's degree.

Gradual advances in the standards of qualifications in the teaching profession, the pressure of accrediting agencies, and other influences cause superintendents and presidents to urge members of their staffs to seek the higher degrees. This pressure sometimes becomes demand. The teacher who moves because of this external pressure instead of primarily upon his own initiative does his graduate work under a severe handicap.

More than 30 years ago, while in the Office of Education in Washington, I made the acquaintance of an industrial-arts leader and thereafter kept track of his career, meeting him from time to time at educational conventions. I remember talking with him on one occasion shortly after he completed a year of graduate study and received the master's degree. I was a bit startled to learn that he did not particularly care to be congratulated. In fact, he said that that period of study was one of the unhappiest years he had ever been through; he would give up teaching before he would attempt another such experience; and more to the same effect.

It was obvious that he had received little or no benefit from the year's work. He did not go into it because he was fired with the ambition to qualify himself for more vital service to his students and to his institution. He was not conscious of a desire to grow professionally; apparently he was not aware of any shortcomings that needed strengthening. It seems likely that he went to the graduate school because he was sent. Approaching the activities of graduate study in that spirit, the odds were against receiving any benefit. The experience did not spell opportunity for him; instead it meant a disagreeable chore. To borrow the picturesque phrase of the sports writer, "he had two strikes on him before he stepped up to the plate."

I have had opportunity to observe the careers of a considerable number of promising young industrial-arts teachers who have earned the master's degree. It is not a source of pride to the degree-granting institution to note that some of these teachers fail to catch the spark of inspiration, and are never heard from again in terms of outstanding achievement or noteworthy contributions to their chosen profession. It is doubtless too much to expect all such men to develop into first-string leaders, but it is not unreasonable to hope that more of them will manifest some dynamic quality.

The one thing that graduate study under expert guidance can do for you is to reveal and cultivate certain latent abilities of which you may now be only vaguely aware, and to equip you with a new quality of self-confidence, courage, assurance, and belief in yourself. Graduate study will also help to define some of the problems upon which you should be working, and to point the directions in which to search for solutions. It will also give you some new techniques of analysis, methods of attacking and studying problems, and perhaps a more satisfactory philosophy upon which to base your work.

If an increase in salary and promotion to a more responsible position come your way, they will bring far greater satisfaction if they are awarded, not simply *pro forma*, because you have gone away and earned the higher degree, but rather in recognition of a new mastery of your chosen field, a new type of contribution you are able to make in teachers' meetings and other forms, a new enthusiasm, and a contagious zest for getting things done.

Before you embark on a program of graduate study, make an honest effort to settle some of these questions, and determine just what your real motive is.

Analyze Your Situation

One way in which an older person helps a younger person in the study of a life problem is not so much in telling him what the solution or the answer is, but in giving him the benefit of a point of view or a method of approach that comes only with experience. The older and more experienced person can see things in a situation that the younger person does not seem to see at all.

To illustrate this point, take the case of a young man who came into the office several years ago to talk over his work. I got out his papers and noted that after graduating with the B.S. degree he went to Town A. After teaching there one year, he went to Town B. After teaching there one year, he went to Town C. This kind of moving about continued for 11 years, with a stay of 2 years in only one place.

When I asked him if he was sure he had exhausted the possibilities for personal growth in each of these high schools before moving on to the next, he said he had never thought of anything like that. He had made no effort to improve the physical layout or organization of any one of these shops, because, as he said, "I didn't know whether I would be there the next year." He had no conception of what it would be to have plans that might require two or three years to work out, such as: a study of his boys to observe how they develop from one year to the next, and how they respond to different methods of instruction, different materials, and the like; or a study of the community, to ascertain what his boys are

likely to do when they leave school, or to get acquainted with parents, local businessmen, and others.

It seemed to be an entirely new idea to this young man to discover that his record contained practically no evidence that the principals of the high schools in which he taught thought well enough of his work to want to keep him. So far as his record showed, with one exception, he appeared not to be "good enough" to hold a job more than one year. Put in that stark form, he admitted, his record "didn't look so good."

One should not make the mistake of drawing conclusions from inadequate data, but surely a record like the one described requires a lot more "explaining" than one in which you remain three years in one place, five years in the next, and inspire enthusiastic letters from the superintendents and principals begging the college to send out more men like you.

It is difficult to see how you will learn the significance of the record you are making until after you have made it, unless you are willing to listen to those who have been over the road ahead of you.

Personal Qualifications

It is not easy to state the qualifications that justify the ambition to proceed with graduate study. Some are reasonably objective, but others are more elusive. In line with what has been suggested above, a good record of undergraduate scholastic attainments is highly important, and indeed essential to entrance at most graduate schools. If your record is sprinkled with entries of "C," "D," "INC," and "Dropped," it will receive very little serious attention. Every enrolling officer has met the student who can furnish a detailed explanation for every such entry in his transcript. But the director of admissions at the graduate school is not easily impressed by "explanations"; he is looking for good records.

Among the less easily defined but requisite characteristics is capacity for leadership. Ambition and willingness to work are essential, but they are not sufficient.

You should have excellent health; that goes without saying. You should have intellectual capacity well above the average; and you should find enjoyment in tasks which require concentration and the exercise of your mental powers.

You should have a reasonable endowment of those qualities described by the psychologist as "personality," and sufficient force of character, to enable you to hold your own in a company of scholars who have for the most part been highly selected for the possession of these qualities.

As a graduate student, you will be associated with the men who are to be the educational leaders of the next ten to twenty years. You should think of yourself as aspiring to a place in this group of leaders, and you should have the determination to prepare yourself to accept the responsibilities which go with such a place. You will find the environment far more intensive, searching, exacting, and intellectually stimulating than anything you have been accustomed to in your undergraduate study. By applying for admission as a graduate student, you set yourself up as a potential leader of your fellows, and you should expect to be prepared to give evidence of the possession of the requisite qualifications.

Teaching Experience

My own personal belief is that postgraduate study should follow a minimum of four or five years of successful experience as a teacher. I know very well that this view is not universally accepted. Some authorities recommend that the fifth year of graduate study, with the award of the master's degree, should follow immediately after the completion of the four years of undergraduate study, which is recognized by the award of the baccalaureate degree. I have listened to all the arguments on that side, without being convinced.

In support of the other side, I may point out, *first*, that the year of graduate study, for the master's degree, is a major investment of time and money. In my opinion, this investment should not be undertaken until you are as sure as you can be that you are going to be happy and successful in your chosen line of work. I do not see how you can have this assurance except on the basis of several years of experience in it.

If you go ahead with graduate study without having this question settled properly after a thorough tryout, as suggested, you run the risk of discovering after you have been teaching for a while that you do not really enjoy teaching as much as you thought you would, or that the special field you have chosen is not the best one for you. In a case like that, while I do not think anyone would say that your year of effort and the time and expense were a total loss, nevertheless it will be a hard lesson. The change to some other line of work will involve a severe wrench that might have been avoided.

Second, three to five years of experience as a teacher will enable you to profit from graduate study in ways and to a degree quite impossible to the student who enrolls without such experience. You will by that time begin to appreciate what some of the problems of the shop teacher are. You will be looking for something definite in the way of help, and you will recognize help when you meet it. You will also learn that some problems are more important than others. You will discover certain items in your personal equipment that need to be strengthened. Meeting and talking with men who have overcome similar difficulties, you will learn how to meet yours.

Third, the possession of the master's degree, without teaching experience, will not qualify you for appointment to a position that is much more desirable than one you might have hoped for with the baccalaureate degree, without teaching experience. On the other hand, the holder of the master's degree, who has had three to five years of successful teaching experience, is eligible to appointment to much more responsible and better paying positions.

Fourth, several years of successful experience in teaching will add something to your mental and spiritual equipment that you can gain in no other way. You will have the satisfaction of demonstrating to yourself and others that you are a success. With this conviction, and in this frame of mind, graduate study will add far more to your self-confidence and assurance than would be possible under the other program.

Objective

Before deciding to go on for graduate study, or perhaps as a part of the process of arriving at a decision, you should formulate a definite objective, or plan, the carrying out of which can be promoted by graduate study. As I have already suggested, it will be much easier for you to understand what an objective for further preparation is if you have a background of teaching experience.

Through experience you may discover that you possess special ability along some particular line, such as organization of teaching materials, planning of shop layouts and equipment, guidance, handling "problem" pupils, drawing and design, research, or writing. Graduate study may appeal to you as an opportunity to prepare yourself for superior service in one or more of these specialties. Through experience, on the other hand, you may become conscious of some weakness, or shortcoming, or "blind spot," which may be materially strengthened or eliminated by further study.

Selecting the Institution

Having formulated a definite plan, you will then be ready to look into the possibilities of the various graduate schools, to determine which one will probably contribute the most to the carrying out of your plan. The selection of an institution for

graduate study should be approached with some deliberation. The making of a good choice is a serious matter. I have already spoken of the experience as a major investment of time, effort, and money.

Graduate study may bring about a complete change in your outlook and a new phase of your career as an educator; or, you may return to your former job, slip back into your old routine, and begin to wonder why you did it. Which of these outcomes, or some other, actually develops will depend in large measure on the kind of stuff you are made of. At the same time, much will depend on the institution, on the associations you make there, on the stimulating influences you meet, and on the ideals and outlook you acquire there.

Faculty Personnel

Undoubtedly, the most significant single factor in determining the influence of a graduate school is the faculty personnel. Personal associations count for more in graduate than in undergraduate study, and they count for more in the advanced work for the doctor's degree than in the earlier work for the master's degree. You should select an institution in which to do your graduate work because you are convinced of the leadership qualities of one or more individual members of the graduate faculty with whom you expect to do your major work.

This emphasizes the importance of your knowing who are the recognized leaders in your chosen field. This knowledge is gained only by extensive reading, discussion with fellow teachers who have a wider range of acquaintance than you have, attendance upon educational conventions, and other means of keeping informed.

You should send for the catalogues of the graduate schools that you know about, and can find out about, and study the biographical data given therein. In this connection, do not overlook the personnel of the supporting departments. In addition to the courses offered in the industrial-education department, you will be required to take certain minimum amounts of work in other departments. The professional leadership qualities of the men in these other departments constitute an important factor in the effectiveness of your total program.

Standards of Graduate Study

Unfortunately, there is no precise standard of quality to guide educational institutions in awarding the higher degrees. The accrediting agencies have accomplished much in this direction, but many decisions must be left to the judgment and discretion of the faculty and the administration of each institution. Consequently, the facts of uncertainty and differences of interpretation must be taken into consideration in selecting an institution.

Soon after you begin your investigation of graduate schools you will discover that there are from 40 to 50 such schools offering work leading to the master's degree, with major in industrial arts and/or industrial education. These institutions are fairly well distributed over the United States, and it should not be necessary to travel far to find an acceptable one for your purpose. I may add that there are probably from 140 to 150 colleges, universities, and teachers colleges offering curricula for the preparation of teachers, leading to the baccalaureate degree, with major in industrial arts and/or industrial education.

At the higher level you can count off on the fingers of your two hands the graduate schools that you need to investigate that offer work leading to the doctor's degree, with major in industrial arts and/or industrial education.

Comparing one institution with another, you will find considerable uniformity in the minimum amount of time prescribed for the completion of the requirements for the master's degree and the doctor's degree, respectively. The minimum for the master's degree is quite generally one year beyond the baccalaureate degree, and for the doctor's degree the minimum is from two to three years beyond the master's degree.

However, you should understand that the minimum is not the maximum. You will find considerable variation among graduate schools in the evaluation of the record of your undergraduate credits. Differences between two institutions in the acceptance or rejection of specific credits (for entrance to the graduate school) may mean a difference of a semester, or even a year or more, in the amount of time needed to complete the requirements for the degree.

This means, of course, that completion of the requirements for one of the higher degrees calls for considerably more time and effort at certain institutions than it does at others. This increased cost in the acquisition may be associated with higher quality or greater professional value of the degree after it is secured, but this is by no means certain or universal. The weighting of these varying factors of cost and professional values in the degrees is one of the major considerations in arriving at a choice.

Professional Standing

The professional value of a degree is a reflection of the professional standing of the institution awarding it. Only a little thought is needed to show that a degree which represents inferior quality, and which requires little effort on the part of the student, cannot be expected to be of any real value or benefit to the holder. You should select an institution that has a consistent record for maintaining high standards over a period of years. You may very properly choose one institution in preference to another, because you can complete the requirements in the former with less effort, expenditure of time, and financial outlay. But that should not be the only reason for your choice. A Studebaker is not necessarily better than a Buick just because it costs a few dolllars less. Other factors must be considered.

You may not have thought much about it, but you should know that it is not sufficient merely to be able to write the initials M.S. or Ph.D. after your name. Much more than you may think depends on the reputation of the institution that awarded you the degree. If you will inquire into the history of the so-called "degree mills" that flourished 30 to 40 years ago, and learn something about what happened to the holders of degrees issued by them, you will understand better why it is important to select a graduate school with care.

One excellent way to arrive at an opinion concerning the graduate school you are thinking about is to find out what you can about its standing among the leading men who make appointments — presidents of colleges, universities, and teachers colleges, superintendents of schools, and principals of the larger high schools. If you have been reasonably active in your State Teachers Association and other professional organizations, you have some acquaintances among these men who will be glad to talk to you. They may not care to put their opinions in writing, and they may ask not to be quoted, but you will almost certainly receive expressions of opinion that will be helpful.

In arriving at a choice of an institution, it will be very helpful if you have met personally the men who are in direct charge of the graduate programs in industrial arts and industrial education — the industrial-education leaders. If you have heard these men speak at conventions; if you have talked with them; if you have read and studied their books, magazine articles, and other writings — these contacts will help immensely in reaching a decision.

If you do not already know these men and their work, I recommend that you go to some good library and look up everything you can find about them in the way of books they have written, and magazine articles published. Also look up biographical sketches in *Who's Who in America*, *Leaders in Education*, and other similar reference works. If you can find sets of the bound volumes of INDUSTRIAL ARTS AND

VOCATIONAL EDUCATION, and *Industrial Education Magazine*, go through the annual indexes to see what you can find under each name.

Another thing you can do is to talk with as many men as you can who have earned master's or doctor's degrees in industrial education. Ask each one what graduate school he attended, why he chose it, what he thinks of it in comparison with other schools, and other questions that will occur to you.

Application

You should also write to each graduate school in which you become interested, and ask for a circular of information concerning graduate work in industrial arts and industrial education. If you have learned the name of the man in direct charge of this special program, address your letter to him. If not, address your letter to the dean or director of the graduate school, or to the registrar.

Another step, which might come a little later on, would be to send a copy of a transcript of your undergraduate record to each man, and ask for an informal statement of the work you would be expected to do to complete the requirements for the degree. It will probably cost you something to secure several "official" copies of your transcript, and so I recommend that you make your own copies for this preliminary inquiry. You can say that an official copy of your transcript will be furnished later, "if and when."

Transfer of Credits

Early in your investigation you will discover that "shopping around" for graduate credits is effectually discouraged. You should not expect to complete one summer session here, another there, and another somewhere else, and eventually find a graduate school ready and willing to award a degree. It just is not done that way. Some schools will not accept transfer of graduate credits completed elsewhere; others will accept limited amounts only, without permitting such transfer to diminish the residence requirement.

This is not altogether a matter of institutional jealousy or unwillingness to recognize work done in other institutions. These provisions come rather out of the lessons of experience. You will discover, when you get into it, that graduate study is a highly concentrated, cumulative, integrated experience. It is something much more than the collection of credits until you finally arrive at a prescribed total.

Graduate study is also a highly individualized experience. The student is under constant observation by a faculty of experts, who are on the lookout for evidences of personal growth, the development of initiative, and other leadership qualities. Graduate study does not function well under a system of peripatetic circuit riders.

Conclusion

In this more or less cursory analysis of the factors to be considered by any teacher contemplating graduate study, you will observe that I have necessarily been rather indefinite in my observations. I have not attempted answers to the questions I have raised or suggested. I have endeavored to call attention to some of the things that should influence your decision.

What The Supervisor of Printing Should Expect of His Staff

LEROY BREWINGTON
Kansas State Teachers College
Pittsburg, Kans.

The print shop in the school system bears a marked resemblance to the commercial printing plant. Since preparation for printing as an occupation has been taken over by the school shop, it is only natural and logical that the aspects of the school shop should bear a strong resemblance to the commercial shop. Both of them utilize the same materials, the same machinery, and the same equipment; both turn out the same products. In appearance they are the same.

There should be very little difference between the two plants in the objectives to be attained. While the commercial shop utilizes the materials, equipment, and machinery for dispensing news, carrying messages, presenting views, and relaying information, the school shop adds instruction to the list. Some of this instruction is to help round out the general education of some students, and some is to give training for vocational purposes in various fields.

Since there is this difference in objectives, it is readily apparent that in some cases marked difference will be found in the obligation placed on the staff member of the school shop as compared with those placed on the staff member of the commercial plant. In other cases, however, the obligations will be identical.

It is more or less understood that the superintendent of the commercial plant expects his workers to be proficient in their work, that they exercise care and discretion in the use of the materials, and that they utilize their time to meet production schedules. The staff members of the school shop should strive, in so far as is practical, to attain the same degree of proficiency. He should consider his pupils as employees, receiving pay for services rendered, in the form of credit. It is also understood that they are expected to use and care for the machinery in a manner to preserve its efficiency and that they turn out products of high quality.

What, then, does the supervisor of the school printing plant expect of his staff member, considering that he is an educator as well as a worker?

He Should Be a Skilled Worker

Before any man can instruct others in skills, he must know something about those skills himself. This does not imply that he must be the fastest in doing certain jobs but the more skillful he is the more respect he commands from those he instructs. Since the time required for working out an apprenticeship in the union is six years at 8 hours daily, it would seem that no less time should be required to prepare a printing instructor, assuming he already had the necessary qualities of an able teacher. Since the man in this capacity is expected to relay information concerning this work to others, it is only natural to assume that the more information he can relay concerning the techniques and methods of doing the job correctly, the more successful he

can be in this line of work. Also, since the school plant, because of its very nature, is concerned with actual production work, the staff member is expected to keep this work flowing as freely and quickly as possible. In this latter respect, the duties of the school plant member are like the duties of the man in the commercial plant. Both fields demand that the workers know how to use the tools and materials of the trade correctly and efficiently.

He Should Be an Able Teacher

The staff member of the school shop should be an able teacher. Occasionally, one finds an expert worker who is also an expert teacher but it is almost a practical truism that not all skillful workers are good teachers. As a general rule, he is one or the other. Since this is the case, it is apparent that the one engaged in this field must find means to eradicate any weakness that he may possess. This is an obligation which he owes to those who employ him. He must learn to use the proper techniques of teaching, to apply efficient methods of testing and measuring, and to devise techniques and methods of his own.

He Must Keep Up With Modern Trade Practices

The staff member should have information concerning his immediate trade and the related trades. Since the average staff member is participating in education relative to vocational work, it behooves him to keep up with the modern trends of his field. A part of his duties will be to relay information based on the development of the trade, and his success depends upon his skill at not becoming outmoded. Printing, like all other industries, is constantly finding new ways of performing the work to accelerate production schedules. Since a portion of his students will be directly influenced by these ways, it is a part of the obligation of the staff member to instruct them in the most up-to-date production methods. Another part of his duties, in this respect, is to keep up with the manufacturers and their products. He should have at hand the information concerning them since the student who is interested in future participation in trade training must look to him for this type of information.

He Must Have Interest in Educational Research

The staff member should be interested in educational research. Although much progress has been made in the field of printing as an educational means, there is still much that has not been explored as yet. The techniques of instruction which have been used in other branches of the industrial-arts field are readily adaptable to printing, and, accordingly, it must be apparent that co-ordination with the academic subjects also must be readily possible. Much progress should be made along this particular line, and the co-ordination must be done for the academic teachers by the printing instructors. Not only must the men in the printing field realize the possibilities of the methods which are now employed in other branches, they must adapt them to printing and must also devise methods and techniques which will be typical of only printing. Very little standardization has been accomplished in the printing area, used educationally. This applies to the methods of teaching, of measuring, and of testing. Standardization and efficiency of teaching will result only when the men in the field participate in research, and pool the findings of these research activities.

Understand Care and Maintenance of Equipment

The staff member should know how to use and care for the materials, equipment, and machinery which are under his care and within his jurisdiction. Printing equipment represents a considerable outlay of money which is always hard to get. This equipment should be kept from abuse so that its efficiency will not be destroyed. The machinery, materials, and supplies should be properly located and kept clean. The machinery, especially, must be kept well lubricated to prevent wear. In every well-regulated plant, it is common knowledge and almost unwritten law that the tools and materials should have places and everything kept in its place when not in use. In case of any breakdown in the machinery, it is the obligation of the staff member to make the repair immediately, with the part intended for use and not with some foreign material which might cause further damage and greater delay. A memorandum method should be kept of all shortages of working materials and equipment parts and given to the supervisor for replacement.

Neatness and Orderliness

The staff member should be a proponent of the theory that cleanliness and orderliness makes for better workmanship. It is assumed that the staff member recognizes the need for this element in his dress and person but it must be carried further than that. A department which is not kept in order has a tendency to cause disorder of work. All waste material should be kept in containers provided for that purpose and all litter should be kept off the floor as well as off the machines and tables. The supervisor should expect his staff member to cultivate this trait, not only because it helps to maintain high standards of workmanship and speeds up production but because the school print shop should maintain conditions which can be copied by the student for use in his future work.

He Should Be Systematic

Any course of study becomes a jumbled mass of unrelated informations if some system of presentation is not adhered to. As a consequence, the supervisor of printing should expect his staff member to develop and use his course of study so that it can be presented in a logical manner which will result in a well-balanced course of instruction for the students. He should have the work so systematized that the student does not come in for overlapping work, and he should have the production schedules so arranged that the work will flow evenly from his department to the next department.

He Should Know and Practice Safety

The staff member should know something of safety rules and accident prevention. In any plant where equipment and machinery is used there is need for accident prevention and the responsibility of this element lies with the staff member. He should investigate the causes of accident in plants similar to his own, and should study the methods employed to eliminate them. He should learn about accident prevention and plan and carry out means of decreasing accidents in his classes. As the staff member is instrumental in relaying ideas of this nature to students who will later work in other plants, it seems natural that he should do his utmost to make his students truly safety conscious.

He Should Possess a Co-operative Spirit

The staff member should possess a co-operative spirit. This spirit should pervade his dealings with the supervisor, the employers, his colleagues, and the students. His co-operation with the employers will, to a large extent, depend on the manner in which he works with the students and the supervisor and his fellow teachers because he does not come in contact with the employer, as a general rule.

Co-operating With the Supervisor

Bearing in mind that the supervisor is the co-ordinator of the plant as a whole, it is apparent that his wishes, ideas, and desires should govern the activities of the staff member. The supervisor is the one to whom the blame will fall in case of error on the part of anyone else, and since he is the one who must assume this responsibility, it is reasonable to expect that he is

entitled to the privilege of determining which course should be pursued. It is not intended by this to assume that there can be no better way of doing the job, nor that there are no better materials for accomplishing it, but in case of doubt, when the other way is suggested, the staff member should be willing to do the best he can in the way that has been determined.

Co-operation With the Students

The students who are enrolled in the department are there for the purpose of pursuing their education. The staff member should co-operate with them in this pursuit since it is to him that they have come for instruction. His co-operation with them does not necessarily mean that he shove instruction and information down their throats. It does mean, however, that he have his course of study prepared in such a way that they are able to use it in the furtherance of their education. He should be ready and willing to place at their command the information which is necessary for them to become proficient in the skills, techniques, and methods of the trade. He should be willing to impart practices of the trade of which he has knowledge and be willing to show methods and short cuts which will enhance their abilities.

Co-operation With His Colleagues

The staff member should be willing to co-operate with his colleagues. Since printing is an industry which is made up of several departments and each department is carried on by an individual or individuals qualified in that particular line with a thread of cohesion running through the whole, it is apparent that the staff member of one department must co-operate with the staff member of the other department. In this manner only will production be kept flowing. The most successful member in either the school plant or the commercial plant is the one who realizes that the man in the other department has his troubles and worries and attempts to minimize them by allowing him as much time for the production work as is possible.

The Present Position of Industrial Arts in Canadian Schools

LINDLEY H. BENNETT
Toronto, Ontario, Canada

(Continued from page 127 of the March, 1949, issue)

Manitoba

The land area of Manitoba is 219,720 square miles. It has an approximate population of 757,000 and has one dominating city and many small towns.

The public schools of the city of Winnipeg have had manual training since its start in 1900, and the city was among the first in Canada to establish a technical high school but neither form of handicraft instruction spread much in the province as a whole.

The educational system of the province is now undergoing reorganization and one of the principal features is the establishment of junior and senior high school divisions with revitalized courses of study, including general-shop work in industrial arts. The junior high course of study was published in 1947 and the course for the senior high is being printed. These courses indicate the general-shop method as well as suggest the subject matter. Plans for general-shop rooms are published by the department of education to indicate how special provision may be made for "areas of shop activities" in which the equipment necessary for the principal types of work are concentrated for convenience of working.

In the outlined courses for the junior high school (grades 7 to 9) there are ten optional subjects, with woodwork, sheet-metal work, bench ironwork (cold bending), and drafting suggested for the first year. The addition of ornamental metalwork and, possibly, bookbinding for the second year; and the addition of casting, forgework, woodturning, electricity, and bookbinding if not taken before, for the third year. Ten per cent of the school time is to be taken for this work.

For the senior high school (grades 10 to 12), general shop may be taught as an option in the general course or as part of the industrial course; in the latter case 30 per cent of the school time must be given to it (approximately seven and one-half hours per week). This course is also for three years and the kinds of work suggested are bench woodwork, wood turning, bench metalwork, metal-lathe work, forging, welding, molding, electrical work, bookbinding, and printing.

In anticipation of the change to the two-level high school, the requirements for teaching certificates for industrial arts were published several years ago. Before entering on teacher training, the applicant must (1) have passed grade 11 university matriculation or the normal school entrance examination, (2) have served an apprenticeship in a basic craft, or have had sufficient exploratory experiences in technical courses or in industry to prove adaptability for successful performance of craftwork, and (3) have an acceptable personality that may be developed for efficient service.

The certificates are respectively the junior high school industrial-arts certificate and the senior high school industrial-arts certificate. Interim certificates, valid for three years and renewable for three years, are issued after completion — for each class of certificate — of prescribed (1) educational courses (philosophy and methods applied to industrial arts) and (2) skills courses (five kinds of practical work — all of which may be taken in evening classes or summer schools) — and (3) attendance of at least six weeks at a recognized teacher-training institution in Canada or the United States. The interim certificates may be made permanent after two years' successful teaching experience in industrial arts and the taking of a further group of educational courses. Before obtaining a senior permanent certificate the holder of an interim certificate must have obtained grade 12 standing.

With regard to the present situation in the province, there are about 50 full-time special instructors of shopwork in the Winnipeg high schools and about 25 more in suburban and rural centers. The work is done mostly in large single-unit shops

which accommodate about twenty pupils at a time. The rural centers usually occupy former classroom space, in many cases two adjoining rooms have been turned into one shop. The pupils spend a minimum of one-half day per week in the shops. The government pays a grant of one dollar per day for each shop teacher, over and above all other grants. It also pays 50 per cent of the cost of equipment, up to a maximum of $400 per shop.

In the elementary schools, there are about 300 teachers who give part time to teaching what is called arts and crafts — simplified forms of industrial arts not requiring much space or special equipment, often being done in ordinary classrooms — such as fretwork and other forms of light woodwork, work in tin, and basketry work.

In addition to the new general-shop courses in industrial arts, the department of education is preparing new high school technical and vocational courses and is organizing a technical institute similar to the one in Alberta which, among other vocational education, will be prepared to give teacher training for certificates in these subjects.

All phases of industrial arts, technical and vocational education are under a director of technical education in the provincial education department.

Saskatchewan

The land area of Saskatchewan is 237,930 square miles. It has an approximate population of 854,000 and is the principal grain-growing province. It has many small towns but few industrial centers. The province has only been in existence for 43 years.

Manual training (lately called shop mechanics) has been carried on for many years for grades 5 to 8 in the elementary schools of a few of the larger places. The work has been a sort of minor general shop, with woodwork and drafting as a major element and such subjects as sheet-metal work, leatherwork, wickerwork, and modeling (clay, papier-mâché, cement) being introduced as desired. The course is now undergoing revision. The new course will be called industrial arts and will feature more craftwork.

The shopwork outlined for grades 9 and 10 of the ordinary high school is of a general nature; that for grades 11 and 12 has a stronger vocational trend. In the first two years the student divides his time equally between the several shop courses offered in the school, taking three or more single-unit shops in rotation. In the last two years he is advised to divide his time equally between two shops. For the composite high school, the general-shop plan is recommended — the various kinds of work are provided for in different areas of the room under the instruction of one teacher. The subjects usually provided for in the general-shop and single-unit shops are drafting, woodwork, motor mechanics, metalwork, and electricity. There are technical high schools in three cities which offer more specialized vocational courses in the foregoing and additional subjects.

The time allotment for industrial arts in the elementary schools is two periods of 1½ hours each per week. In the high schools it is two hours per week for students following an academic course and from 4 to 6 hours per week for those following a technical course, with additional time for vocational students.

There are 75 special industrial-arts teachers in the high schools and ten in the elementary schools. The government grant per teacher in the high schools is $5.25 per day. In the elementary schools it is $1.50 per day (the same as for ordinary teaching).

Technical education in the high schools is about to undergo a radical change. The vocational work which has been concentrated in three cities is to be spread over the province so as to be made accessible to students in smaller communities. About 30 towns are building and equipping premises — usually attached to an existing high school — for the teaching of shopwork, commercial work, and homemaking. The government is paying 80 per cent of the cost of these additions.

The shopwork section of the new buildings will provide for two types of courses: (1) an industrial-arts course for students who propose to attend university or enter a profession, and (2) a general mechanical course for those who expect to enter industrial work after leaving school.

A new type of certificate is now in force for teachers of technical subjects — commercial, home economics, and industrial arts. An interim junior technical certificate in industrial arts, valid for three years, is granted to those who (1) hold a first class teachers' certificate and (2) have completed courses, satisfactory to the department of education, in drafting and in any two of electricity, farm mechanics, machine- shop, motor mechanics, sheet metal, and woodwork at a technical high school or other institution. This certificate may be made permanent after (1) two years' successful teaching of industrial subjects, and (2) completion of a six-weeks' course, approved by the department, in the principles and methods of industrial-arts education. Requirements for a senior certificate are now under consideration.

There is a supervisor of technical education in charge of all the work under the department of education.

Province of Alberta

The Province of Alberta has a land area of 248,000 square miles, with an approximate population of 846,000. It was formed at the same time as Saskatchewan, both of them being carved out of the old Northwest Territories.

In Alberta, the elementary school is restricted to the lower 6 grades, but grades 7 to 9 are called the intermediate school, not junior high school as in several other provinces. It is a distinct educational unit with examinations at the end of grade 9. The high school, or secondary level, consists of grades 10, 11, and 12.

In the intermediate school, the shopwork is called industrial arts. Drafting is

Industrial arts in the elementary school. Projects made by summer-term students at Northeast Missouri State Teachers College. Photograph by Kenneth Sykes. Submitted by Roland F. Nagel, instructor

compulsory in all grades in which shopwork is taken, and it is compulsory to take woodwork as one of the subjects in grade 7. Beyond that there is a wide range of options, those generally being provided for in the shop layout, besides woodwork, are metalwork and electrical work. Other options are cementwork, leatherwork, and bookbinding. Two kinds of work are usually taken in addition to drafting.

The program of studies contains outlines of what should be taught in each grade and suggestions as to suitable projects but there is no set course of models or prepared designs. Pupils are encouraged to choose projects which involve experiences in several kinds of material.

The shops are usually equipped with a selection of small motor-driven machines such as one or more wood-turning lathes, a metal-turning lathe, circular saw, band saw, jig saw, jointer, shaper, drill press, and emery wheel. Space is generally allocated for a small forge and for soldering equipment.

Industrial arts is an optional subject of instruction but where it is provided it is taken by all the boys in the intermediate school for ½ day per week. It is interesting to note that girls may take this work as an optional subject and that boys may take home economics — it is usually only done where the numbers are small.

There are 60 men teaching industrial arts full time, with some others teaching part time; some of them teach in more than one center, and several travel by automobile between two or three small towns.

In high schools and collegiate institutes the shopwork options consist of technical electives, farm and home mechanics, and drafting (two years only). There are 35 men teaching these subjects full time in the secondary schools.

The technical electives (designed for city schools) are woodwork, metalwork, electricity, automotives, arts and crafts, and printing (two years only), with parts 1, 2, and 3, respectively, for grades 10, 11, and 12. Two technical electives may be chosen in each grade. The time devoted to the work is from 1 to 2 days per week. For each subject in grade 10 or 11, two class periods are allocated to related theory, two to shop drafting, and four to shopwork. In the third year of any subject there may be either 6 or 10 periods for shopwork.

Farm and home mechanics (designed for rural high schools) offers courses in woodworking and farm construction; electricity and rural electrification; farm and home planning and water and disposal systems; farm machinery and farm power units; metalwork; and concrete work. The first year's work must consist of woodworking and concrete work; the second year's work must include metalwork, with one other; the third year's work must include electricity, with either one or two others. The time given to farm and home mechanics is ½ day per week.

To teach industrial arts in the intermediate schools, the instructor requires an elementary and intermediate professional general certificate and a junior special certificate in the subject. To teach shopwork in secondary schools, a high school professional certificate is required and a junior or senior special certificate. The courses for the special certificate may have been taken as part of the regular training for a general certificate or at a summer school.

Since 1945, all teacher training has been undertaken by the University of Alberta and the training courses are arranged to lead to a B.Ed. degree. Candidates for the B.Ed. degree in industrial arts take three years at the Calgary branch of the faculty of education and a fourth year at the University in Edmonton. While in Calgary, students take three and one-half courses (of 150 hours each) in shopwork subjects each year at the Provincial Institute of Technology and Art — affiliated with the University. For teachers of unit shop courses in secondary schools, a modified course is offered.

The government grant for any shopwork teacher is $150 per annum more than for an academic teacher. The government also pays 25 per cent of the cost of approved equipment, up to a maximum of $200 in any year for each teacher of vocational subjects employed.

When two or more districts combine for the purpose of providing instruction in vocational subjects, either by traveling teachers or centralization of schools, the government pays a grant of 50 per cent of the salary, and the traveling expenses of the teachers. It also pays 50 per cent of the cost of approved equipment, to a maximum of $1,000 for each center, and 50 per cent of the cost of equipment purchased in any other year, not exceeding $100 for each teacher or unit.

There is a government supervisor of industrial arts for the intermediate and secondary schools of the province.

The education department of Alberta has operated for many years the only institute of technology and art in Canada. It provides technical vocational education for men and women of all ages (over 16). Its principal work is outside the scope of this article but it has contributed largely to the development of practical education in the schools through the many forms of handwork taught in its summer school for teachers and the training of teachers of industrial arts. Most of the money received by the province from the Dominion Government between 1919 and 1930, under the first Technical Education Act, went into this institution.

The Province of Nova Scotia

The Province of Nova Scotia has a land area of 20,740 square miles, and an approximate population of 635,000. The official name for industrial-arts work is mechanic science, although the former name is used. The work is carried on in all the high school grades, of which grades 7 to 9 are in the junior high and grades 10 to 12 are in the senior high. There are 45 licensed teachers of mechanic science operating 50 shops in 34 different places.

There are two main types of shops — the general woodshop and the general metal shop, including electrical work. The two kinds of shops usually have separate teachers. Some teachers operate two similar shops on a part-time arrangement. There are a number of shops in which one teacher handles both the wood- and the metalwork. In rural areas the shopwork may vary according to local needs — such features as forgework, acetylene welding, motor mechanics, or building construction may be added to general wood or metal instruction. Drafting is done in connection with the work in all shops. Each pupil receives one shopwork lesson of from two to two and one-half hours per week. Pupils above grade 9 may receive two such lessons per week.

An unusual and interesting method of providing industrial-arts instruction for rural schools, on good roads, is the shopmobile, or shop on wheels, built by the Highway Department for the department of education. This vehicle is a cab-over-engine truck with a lengthened chassis, giving a floor space of 26 ft. by 8 ft. It has electrical outlets for light and power, which are supplied at stopping places by means of an extension cable. It is equipped with a turning lathe, variety saw, jig saw, drill press, grinder, and forge. There are tools for woodwork, sheet-metal work, welding, blacksmithing, plumbing, rope splicing, harness repair, and equipment for blueprinting. The vehicle operates as a general shop and accommodates 12 pupils at a time, doing different kinds of work. Each class gets ½ day, and 120 pupils are taught between Monday morning and Friday night — the shopmobile making six or more stops per week. The first two cars were operated by the education department on two different routes for four years and

then sold to local people, who are now operating them. The department is now running two more in other districts for two years, after which they will be sold to these districts — or moved elsewhere.

The government bears the whole cost of the shopmobiles while it operates the routes. For ordinary shops, the government pays one-half of the initial cost of the equipment, to a maximum grant of $500. A maximum annual grant of $500 is payable for one licensed teacher; for two or more teachers under one school board, a maximum grant of $1,000 is payable to each board.

Industrial-arts teachers take two years' training at the Provincial Normal College in Truro. The first year follows mainly the teacher-training course for an ordinary teachers' license; the second year is spent in shopwork and specialization. Those who take the two years' training receive a first rank teachers' diploma and an interim mechanic science license, which may be made permanent after three years' successful shop teaching. Teachers who hold a permanent mechanic science license may be awarded an industrial-arts diploma and a superior first class license by attending not less than two summer school sessions and taking three or more courses of an advanced nature, totaling not less than 200 hours' instruction, in specified industrial-arts subjects at an approved institution anywhere.

There is a special inspector of industrial arts who supervises the work for the department of education.

The Province of New Brunswick

The Province of New Brunswick has a land area of 27,470 square miles and an approximate population of 503,000. The old form of manual training woodwork is still carried on up to grade 8 in some schools, but the number is decreasing. More varied forms of handwork have been introduced in order to increase the range of factual experiences and give preliminary training in more skills. In several provincial school systems this has been accomplished by expanding the manual training into industrial arts but in this province the work has been placed under a vocational education act and reorganized as a prevocational course. The course covers two years and is open to pupils who have reached 12 years of age and have passed out of grade 6. For two-thirds of the school time they take the same general subjects as are prescribed for the academic grades 7 and 8. The remaining time (for the boys) is devoted to several forms of handwork, the minimum being drafting, woodwork, metalwork, and electric wiring.

Under the same provincial vocational education act, and paralleling grades 9, 10, and 11 of the ordinary high school course, there is a three-year full-time day vocational course. The pupils must be 14 years of age and have passed the high school entrance examination or completed the prevocational course successfully. The course includes both general and special education, with approximately one-half time devoted to each. Six special vocational courses are offered; the general education program is common for all of them. The special education for the industrial-vocational course consists of: drawing; mathematics and science; study of materials; practical work in the fundamental operations and processes of a number of trades, selected to suit the community. The first part of the course is used for tryout experiences; in the latter part of the course the pupil specializes in one or more chosen trades.

Teachers of practical subjects and related theory must have at least an interim certificate covering the special subject taught. The requirements for the certificate are as follows: (1) general education equal to high school graduation; (2) trade training and five years' experience as a journeyman worker; (3) professional teacher training of not less than six months. An interim certificate is valid for three years. A senior certificate may be granted to the holder of an interim certificate after three years of successful teaching experience and approved professional improvement. Senior certificates are valid for three years only but are renewable. For directors, supervisors, or department heads, other certificates are required.

There are 10 teachers of prevocational shopwork and 12 teachers of vocational shopwork. Shops are in operation in 14 schools; others are being organized. There are 16 manual training teachers, holding professional licenses, who operate centers under an earlier act.

The government grant for manual training is $220 per center per annum. The grant on prevocational and vocational teachers' salaries varies according to the population of the town or district in which the school is situated: In districts having less than 2000 people, 75 per cent of the salary cost is paid; between 2000 and 6000 population, 66⅔ per cent is paid; over 6000 population, 60 per cent is paid. For vocational schools, the government also pays a grant of 50 per cent on the cost of approved equipment.

The work is in charge of a director of vocational education in the education department of the government.

Prince Edward Island

Prince Edward Island has a land area of 2180 square miles and an approximate population of 93,000. It is the smallest province in the Dominion, both in area and population.

Manual training woodwork is carried on in grades 6 to 8 in two city schools. A full-time handicraft teacher is employed to visit rural areas for evening school instruction in weaving and needlework. These teachers have regular teachers' licenses and also specialists' certificates. The government pays approximately one-half of all teachers' salaries. Plans are under way for the establishment of regional composite high schools which will include courses of a vocational nature.

A vocational school of a technical-secondary nature is in operation in a wing of the Prince of Wales College at Charlottetown. The admission requirement is the high school entrance examination. A new course of study is in preparation for this school.

Conclusion

From the foregoing account of the shopwork being carried on in the common schools of each of the nine provinces, it will be seen that it is now officially recognized as an element of general education. Statistics of its growth are significant of its popular acceptance. In June, 1903, after three years of subsidized demonstration, there were 45 teachers of manual training spread across the Dominion and about 7000 pupils from grade 6 upward taking woodwork. In June, 1948, there were more than 900 special shopwork teachers in the schools and approximately 140,000 pupils in grades 6 to 12, taking a great variety of industrial-arts work. While the population of Canada has doubled in 45 years, industrial-arts instruction has increased twentyfold.

It should be recorded that although the Dominion Government has no direct control of education in its constituent provinces, it has assisted materially in the general advance of industrial education. The Report of the Dominion Royal Commission on Industrial Training and Technical Education, published in 1913, with its detailed account of work being done in Europe and the United States, gave a great impetus to practical education of all kinds. The Dominion Technical Education Act, based on recommendations in the 1913 Report, provided funds from 1919 to 1929, on a population basis, to all provinces which would take advantage of a grant, on a dollar for dollar plan, for the building, equipment, and operation of schools to provide "technical education of less than

college grade." This greatly increased the number of schools. In Ontario, for example, in 1919 there were 11 technical schools operating under the department of education; in 1927 the number had increased to 38 as the result of this aid.

The Dominion Department of Labour, which administered these funds, has since administered other funds for the training of adolescents and adults. The Vocational Training Co-ordination Act of 1942 is still in force and permits financial assistance to be given — among other purposes — to any province for "the development and carrying on of vocational training on a secondary school level." The enlargement of the work provided for the upper grades in several provinces may be traced to this source.

Guidance in the Industrial-Arts Shop

ALICE HELEN FRANKEL
River Forest, Ill.

Today, even though a boy or girl leaves school after having taken a good course of industrial arts or vocational training, he has usually been sent out incompletely prepared to earn a decent living. Once graduates are on their own, they frequently discover, unless they come from a school which taught occupational information, that they need to know, but do not, facts about the job world. Which industries employ the greatest number of workers in each particular trade? Which fields are expanding and hence offer increasing numbers of opportunities? Will a specific occupation have jobs in all sections of the country, or just in certain regions? Which vocational fields employing people of a given trade or skill offer the greatest security or the steadiest work? The whole course of an individual's career, perhaps of his life — the extent of security and success he achieves — often depends upon his having that knowledge.

A century ago, a young man had his choice of only a few hundred occupations; today he must make his selection from some 21,500 different jobs. Meanwhile, in specific fields a hundred years earlier, working with metals might mean that his choice of work was confined almost entirely to blacksmith shops; today his training can lead him into such widely varied places as steel mills, foundries, automobile factories, electrical appliance concerns, agricultural equipment plants, or any one of a thousand other different businesses. As the number of possible fields where he can use his skills expands, the need for accurate, up-to-date information about those possibilities grows increasingly urgent.

In recent years, more and more educators have realized this. The growing complexity of the job world has made industrial-arts instructors see that teaching students electricity, woodworking, machine-shop practices, foundry, welding, forging, sheet-metal work, printing, auto mechanics, drafting, etc., is often not enough. Even with mastery of a skill or trade, the youngster going out to get a job doesn't know what paths exist, much less which ones he should follow in order to find the best possible place to utilize his particular talents.

The School's Responsibility

Obviously he needs information. But where shall he get it? Only the exceptional student will ever suspect that he requires these facts and have the initiative to hunt them up. Consequently the school must assume the responsibility for giving them. When the school realizes the imperative need for guidance of this type, it may institute some sort of guidance program, not for shop students alone, but for the entire student body.

One such program was outlined in the June, 1947 issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. In it, Claude Keesling described the guidance program in a large high school. His article tells about personnel, equipment, interviewing, orientation, home-room functions, the testing program, placement, and all the other guidance activities. But even as well developed a program as this often fails, in most schools, to go far enough to meet the specific requirements of the industrial-arts student. While pupils need what they get from a guidance set-up like this, the vocational-education teacher can bring them more specific guidance. The type of service which the individual subject teacher can and should give, begins where the guidance specialists leave off. It is devoted primarily to furnishing the pupil the particular information and guidance *within* his chosen field that he needs to attain maximum success. Moreover, the student will get the facts, not when it suits the convenience of the entire school plan, but rather when he, the learner, is ready for them.

So far we have talked only about the industrial-arts teacher fitting his efforts into the broader framework of an established, functioning, fairly complete guidance program. However, many teachers — far too many — find themselves in schools where there is no guidance program at all, or where the program has a narrow scope and perhaps includes only some intelligence testing for entering students, a placement service for graduates, and a person responsible for interviews with failing or disciplinary problem pupils. Here some sort of guidance by the classroom teacher becomes essential, if the student is to gain the maximum benefit from his course.

The Industrial-Arts Teacher Guides

Where there is no adequate guidance program, the teacher must begin with the basic problem of, "who belongs in my classes and who does not?"

Every industrial-arts teacher knows the boy who flunks history, struggles unsuccessfully with English, is the despair of his Latin teacher. All schools have them. And, because the administration doesn't know what else to do with the student, he is sent off to take shop courses. Discouraged by his 100 per cent failure up to now, the boy would rather leave school, and comes to class in a surly, negative frame of mind. Still, in many cases the industrial-arts teacher succeeds in interesting him. The student has latent abilities — such as mechanical aptitude and finger dexterity — abilities that just didn't fit into a more academic program.

With his natural aptitudes put to use, the student's dislike of school vanishes; he begins to gain enthusiasm about class and perhaps soon turns out some rather fine projects. The industrial-arts class has served a very great educational and guidance function — far greater than any number of interviews or scoldings could ever do. Not only has it salvaged a youngster's self-respect and banished his sense of failure, but also it has guided him into a field or general area where he will do his life's work and be happy in it. Even though there was nothing in his past rec-

ord to show it, he belonged in a shop course.

However, other students who haven't adjusted to college preparatory or similar courses come into the industrial-arts classes, but they do *not* work out. Placed in a shop course in the hope of finding something that they can or would like to do, they fail to show the necessary aptitudes for the work. And so, finally, they flunk, and eventually drift from the school.

Still other students (the majority) come to the industrial-arts classes because they elected to; usually because they really want to learn a skill or trade that they will use later in life.

Thus the important point becomes obvious: the industrial-arts instructor can do a far more effective job of teaching and guiding if he knows, early in the course, which pupils really belong in it, and which are wasting their own and his time.

One way is to give incoming students interest and aptitude tests during the first week's classes. A person lacking a natural aptitude in a given area can concentrate, work, practice hard, and eventually reach the level of performance at which a person with innate ability arrives rapidly and easily the first few times he tries. A good test will disclose quite accurately the presence or absence of mechanical aptitude, finger dexterity, and similar native abilities. While testing remains the quickest and most efficient method, the teacher can often learn much through observation.

He should then act on his knowledge, suggesting shop subjects in which each pupil is most likely to do best. He should seek to divert into other fields those pupils who he knows cannot make the grade or who will never attain much success in the industrial arts. He won't encourage a pupil who is bored by mechanical drawing, who never evidences any interest in how things are put together. He'll not try to hold the student who can just barely comprehend the simplest shop mathematics or who is all thumbs whenever he picks up a tool. If the industrial-arts and vocational-education graduate is to be happy at his work and to achieve success, his likes and talents must fit into that field.

The right student in the right course is only the beginning of the industrial-arts teacher's guidance job. His major function is that of giving pupils information about all of the places and different businesses wherein their specific skills can be used. Foundry work, welding, carpentry, and the other trades aren't used in a vacuum, but within some vocational field: construction, manufacturing, transportation, etc.

How can the industrial-arts worker combine an interest and ability in some occupational field with his liking and aptitude for shop work? Take the electrician, for example. Because he likes to see things created, he may decide to go into the construction business. Taking a job with a big contractor, he works hard and one day rises to foremanship. If he has the necessary ability to supervise other workers and to deal with people effectively, if he takes the trouble to learn all about other construction jobs, he may become a superintendent on big projects and hold an important executive position. Then again, he may start in a small electrical establishment, save his money to accumulate capital, and eventually own his own small shop. Perhaps, on the other hand, no matter where he works, his scientific interest in the why's and how's of electricity, plus his high level of intelligence, lead him into night school courses in electrical engineering. With persistence, he can win his degree and get a job as an electrical engineer. The electrician who combines an interest in social service with his interest in electricity, and who, in addition, can get some formal training in education, may prefer to teach the subject in a high school or trade school. Meanwhile, other electricians with literary aptitudes may end up editing a trade journal or the house organ of a factory which makes electrical equipment. For each type of industrial work, the possibilities vary as widely.

Where the Best Opportunities Lie

Knowledge of how industrial-arts skills fit into the whole world of business and industry can help students in another way. Through it, they discover which fields are large (automobile manufacturing and construction, for instance) and offer many opportunities, and which fields are comparatively small (television, architecture, silversmithing) and hence present only limited numbers of jobs for craftsmen. They can judge which fields are expanding, which are static, and which are sliding downhill. Equipped with practical information, they have excellent chances of electing to enter fields that offer the most, or the best opportunities for advancement.

Lines of Promotion

The industrial-arts teacher can assist his students still further if he will point out to them lines of advancement leading up from the entrance jobs. In many of the trades, such as carpentry and cement finishing, once the worker achieves journeyman status, opportunities for promotions are quite restricted, although a few workers will always manage to become foremen, superintendents, and independent contractors. When workers find employment in factories, they can sometimes use their trade as a steppingstone. A cabinetmaker in a furniture factory, might, provided he has sufficient talent and knowledge, become the chief designer.

Part of achieving jobs higher up the occupational ladder lies in performing one's assigned duties well; more in preparing for the position above. Many industries have established patterns of advancement, while in other places, the situation revolves around the worker's ability to notice opportunities and develop them. Most of the fields in this type of work require the knack of handling people for those who aim for foremanship jobs, or demand additional training before workers can qualify for promotions.

Then, too, an inventive mind may give the individual the break he needs. Many of today's successful industrialists started out in the shop, saw ways of improving the machinery, tools, or processes, or devised new types of products. Eventually some struck out on their own and began to manufacture a product or a small part of machinery. With careful planning, proper management, and good luck, their companies grew to become important suppliers of various industrial equipment. Others remained with their employers and rose to key positions as plant superintendents or even executive vice-presidents. Students should, however, be warned that it is becoming increasingly difficult for craftsmen to advance in this fashion, because modern invention has made manufacturing processes incredibly complicated. Holders of top jobs must meet an ever increasing demand for engineering or similar technical knowledge for their work.

Because knowledge of where various starting jobs lead may make a tremendous difference to the youth who yearns to get ahead, such information should be given to him while he is still in school.

What Employers Expect

The industrial-arts teacher should impart information in yet another area — how to get along on the job. Many a teen-ager who is careless with tools, does sloppy work, never follows directions or specifications exactly, and becomes un-cooperative when criticized, can be saved from failure on that important first job through knowledge of what employers expect of him. Pupils should be told, or directed to sources of information that will tell them why industry desires prompt, careful workers, why accuracy is essential, how vital is the ability to get along with others.

They should hear about such studies as those of Harvard University's Bureau

(Continued on page 153)

Industrial Arts and Vocational Education
John J. Metz, Editor

WHY IS THE WORLD NOT AT PEACE?

With world conditions as they are, with a cold war creating uncertainty and suspicion between many nations, with a real war in the offing, the question uppermost in the minds of many is, when will peace be established?

It is hard to imagine why the 1949 brand of human beings, so far advanced in science and the art of devising things to make life more livable, should be so inept at getting along among themselves. One wonders why man should rather labor inventing and producing better means of annihilating his fellow men than making things that will better living conditions for himself and others.

The last war has bankrupted some nations and has increased our own tax rate so enormously that there are some who predict the ultimate collapse of our own economy. Our progress in discovering how to use the forces of nature has not brought us nearer to the Supreme Being who controls the forces of nature and gives man the intelligence to unlock those forces. Instead, man in his pride takes credit for all advances and tries to dominate the more unfortunate.

Under such conditions, there can be no peace, no trust in those with whom we have to deal. There must be a regeneration from within the individual. We must again come back to the realization that might is not necessarily right, and that the most gifted, the richest, and the most influential, is still subject to the Ten Commandments.

Why has man gradually forgotten all this and become a law unto himself? Why have we lost the moral and spiritual insight which our ancestors had in a much greater measure than we seem to have? Probably the greatest Teacher of all gave us, who also are teachers, a directive when He said "Lest ye become like these little ones . . ."

Probably we ourselves must return to the trustfulness and simple faith of our childhood. Above all, we as teachers have the duty of bringing up every child that is placed in our charge in such a way that he has a thorough understanding of what he owes to others. These children must be brought to a realization in every classroom, no matter what subject is being taught, that they must be honest and fair in their dealings, obedient to existing laws, respectful to those in authority, careful not to infringe on the rights of others, and be scrupulously exact in their decisions of what is theirs and what belongs to others.

Can we teachers help them acquire the right kind of characters? Have we failed to do so in the past? Are we the fault of some of the breakdown of morality in the present era? It might be well that we examine our individual consciences in this matter and see what we can do about our duties and opportunities with the young, in the future. Our hope must be that the youth who are going through our schools at present, can be educated and trained in such a way that they can again start this world on the right path so that future generations can be sure that the individual whether rich or poor, will have his rights respected everywhere.

CANCER

The annual drive staged by The American Cancer Society deserves our help.

The annual cancer death toll in the United States has increased from 117,800 persons in 1930 to 189,811 in 1947. This is an increase of 72,011 cases in 17 years.

Statistics gathered by the American Cancer Society show that cancer strikes one of every two homes in America.

These figures are staggering, especially if one adds to the numbers the fact that those afflicted with the disease have to undergo severe pain. Then, too, it has been found that cancer appears to arise due to occupational causes in an increasing number of cases. There are still many things to be discovered about the disease. If everyone would assist just a little, it would mean a great deal in making it possible to study this dreadful disease and eventually to overcome it.

That real results can be achieved is shown by the surveys conducted by the society in Vermont. This study disclosed that because of public education and service to cancer patients in Vermont, the fatality of the disease has increased little in that state, while going up 50 per cent, since 1935, elsewhere.

Informative pamphlets and posters can be obtained from The American Cancer Society, 47 Beaver St., New York 4, N. Y. Some of this material could be used as bulletin board material the year around — a worthy effort for any altruistic shop teacher who wants to start out his students with the right attitude toward helping one's neighbor and being interested in the solution of civic problems.

A GOOD SHOP DEMONSTRATION

Those who were fortunate enough to attend the industrial-arts session held on Saturday morning, December 4, 1948, at the A.V.A. convention in Milwaukee, witnessed four excellent shop demonstrations which could well be used by shop teachers in selling their subjects to the students of the entire school, or to the teachers at a teachers' meeting, or at a P.T.A. gathering.

The method used was simple but very effective. The demonstration team in each case consisted of an instructor and two or three students. The instructor was the narrator, at times the demonstrator, but for most of the time he was merely the director who saw to it that the students did their demonstrating so that the audience could see what and how it was done, what tools were being used, the materials that were needed in making the project, and what aids might be employed to make the job easier.

The audience was composed of instructors who had themselves given many demonstrations. Everyone there, however, showed great interest and paid strict attention. They felt that the methods employed were novel, and could be applied in a number of situations, and for a diversity of purposes.

Probably the only improvement that could have been suggested for the program was the utilization of a large projecting mirror like the one that was used at a demonstration session of the A.V.A. at Los Angeles. This mirror, a description of which may be found on pages 321 and 322 of the October, 1948, issue, helps the audience see just what is on the demonstrator's table and what the demonstrator is doing.

The main value of the Milwaukee demonstration to my mind was the fact that teacher and students were working together to give the audience an idea of the interesting work they were doing in their school shops.

GUIDANCE IN THE INDUSTRIAL-ARTS SHOP

(Continued from page 151)

of Vocational Guidance, Carnegie Institute, Purdue University, Professor Endicott of Northwestern University. In each case, surveys of industry were made. Through them, what businessmen expect from their employees was discovered. Thus students will come to appreciate the great importance industry places on desirable personality and work habits. Even in a field, where specific skills are essential to doing the work, these personality traits may make the primary contribution to promotion, getting bogged down in one place, or losing a job. To send pupils out possessing the necessary technical abilities, yet ignorant of these other equally important qualifications, jeopardizes their futures in business.

What Can the Teacher Do?

The industrial-arts teacher who will make sure his students receive all this essential job information, gives them valuable insurance for their occupational adjustment and success. If he possibly can, the classroom instructor should undertake this task, even though a crowded schedule may mean little available time for extras. He'll begin with securing the necessary job facts through books, pamphlets, and periodical articles. Next, he must impart that information to his pupils.

Lectures or mimeographed summaries of what he found are frequently used methods for transmitting the information to classes. Special trade and vocational schools may find it more expedient to include a short, separate class or perhaps to have a series of assembly-period talks in which students receive the information. Sometimes the regular teachers take this over — at other times local businessmen are invited to lecture.

When the busy industrial-arts teacher finds himself too rushed to dig out the facts and present them, he can have his pupils do their own searching, and confine himself to directing their activities. Here the first step will be referring them to the school or public library. So that the librarian may review what the library possesses, order additional items if necessary, and arrange to have material available when the students arrive, the wise teacher consults her before sending in his students. A particularly useful device is a loan from the library. The librarian assembles all of the vocational and job-adjustment materials that meet the class's needs and lends them to that room for two, four, or six weeks. Passing them out to his pupils, the classroom teacher makes certain that they circulate promptly and widely. If he is genuinely eager to guide his pupils, the instructor will find still more ways of giving them the information they need.

Besides Vocational Guidance

The industrial-arts subjects can prove highly useful in educational and personal guidance, as well as in occupational guidance.

Educationally, they often supply motivation for other school subjects. Thus, for example, when students have difficulty solving problems in electricity, they come to see the need for studying mathematics; they realize they must know some chemistry if they wish to understand certain phases of their metals work. Then, too, through shop courses, pupils may test whether their tentative vocational choice was right or wrong. They may discover that they are basically in the right field, but on the wrong level. For instance, a course in shop practice may convince a boy that he would be happier as a tool-design engineer, that it's worth his while to struggle working his way through college to attain an engineering education.

On the personal guidance side, industrial arts, because many hobbies stem from them, may lead the way to more valuable utilization of leisure time in later life. The lawyer who makes objects of plastics, the advertising agency art director who makes ceramic articles in his spare time, the grocery wholesaler who has a woodworking shop in his basement all enjoy hobbies which give them far greater pleasure and benefit than could a constant round of movie-going, long evenings spent reading detective stories, or playing cards.

Finally, through industrial-arts classes, teachers can give a certain type of personal guidance very forcefully, yet unobtrusively. They can help students see readily causes and effects, for careless workmanship will show up immediately in a lopsided table or a broken tool. Patience, carefulness, accuracy, and respect for good workmanship can be the shop-teacher's contribution to his students' character development, if he will just be on the alert to note and utilize appropriate situations when they occur.

Sending Them Out Prepared

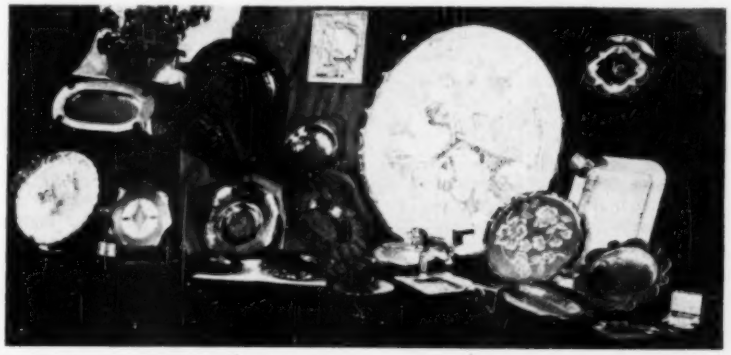
Because the industrial-arts teacher already has many tasks, adding vocational guidance to his duties gives him one more problem to deal with. Yet adequate and accurate occupational knowledge greatly augments each pupil's chances for getting, holding, and advancing on the job. Consequently more and more shop instructors are realizing their students' need for job information. They are increasing their efforts to make sure that their pupils go out into the world possessing it, for only thus can young people use their shop training to its greatest advantage.

IN CASE OF FIRE, WALK! DON'T RUN!

Power failure used to be a very serious safety hazard in hotels, hospitals and other institutions, in theaters and nights clubs, and wherever else people are gathered under conditions where a power failure may cause panic.

Now, with phosphorescent — or so-called "luminous" — safety signs available to mark all exits and fire escapes, this hazard can be, and is being, eliminated. These glowing signs are visible in total darkness long after the usefulness of ordinary signs has ceased, and they serve as ordinary signs in bright light or daylight.

Installations of "glowing" exit signs and arrow markers in the Park Hotel, Plainfield, N. J., the Stacey-Trent in Trenton, and the Robert Treat in Newark are the forerunners of many others. — *The New Jersey Zinc Co.*



Art-metal projects made by the summer-term students at Northeast Missouri State Teachers College. Photograph by Kenneth Sykes. Submitted by Roland F. Nagel, instructor

Aiding The Diversified Occupations Student to Adjust to His Job*

WILLIAM P. GREEN
Director of Vocational Education
St. Joseph, Mo.

BENJAMIN J. NOVAK
Murrell Dobbins Vocational-Technical School
Philadelphia, Pa.; and
Supervisor of Graduate Research in Vocational Education
Colorado A. & M. College; and
Lecturer in Vocational Education
Temple University

The recent war witnessed a temporary increase in "schoolwork" programs of various types. In these plans educators generally succeeded in achieving the duel purpose of retaining the ties of students with the school, and helping to relieve the critical situation in the labor market. Many high schools introduced co-operative work programs for the first time, while vocational schools enlarged the scope of plans which in many instances were in operation before the war.

In many situations school-work experiences were considered to be of an emergency nature only, and inferior to regular full-time school instruction. Where this philosophy prevailed, the end of the war emergency witnessed an abandonment of such plans.

Many educators, however, see positive and permanent educational value in supervised work experience. Vocational education since its earliest days has included this in its planning. Many reports[1] of co-operative work programs in all phases of vocational education appear in the literature.

Importance of Diversified Occupations Programs

Programs in diversified occupations have been operating in midwestern states for more than ten years. They appear destined to expand their service and usefulness even in the face of our lessened postwar labor need. Throughout the state of Missouri alone in 1947 there were 54 programs, serving some 1700 students.

The program as outlined in the Missouri state plan for vocational education may be cited as an example.

The purpose is stated as providing legal employment in industrial and business establishments, with systematic job training and supplemental school training for groups of young workers having various individual occupational objectives. Students who are 16 years of age or over and enrolled in grades 11 to 14 are eligible. A community advisory committee of employers and employees is also stipulated. The program is to be organized for a minimum period of 36 weeks per year. Each student is required to spend a minimum of 15 hours per week on the job. Part of the working time may be on nonschool days. The Missouri plan further provides that a training schedule be worked out for each student-worker. This includes a list of skills to be learned on the job and a schedule of related and technical information to be offered by the school. A teacher co-ordinator is to give the related and technical information of common interest on a group basis. Other related information of a specific nature may be taught on an individualized study basis in a segregated class or the students may be distributed among classes in which are taught the studies which make up the general curriculum of the school.

The older type of co-operative school-work programs in vocational education have appeared mainly in large communities presenting a comparatively large vocational program. The work experience generally supplements school-shop training. The *diversified occupations program*, on the other hand, is useful in smaller communities or in districts presenting limited vocational offerings. In these programs, business or industry take the place of school shop instruction. Besides its obvious value in broadening educational experiences, it develops closer co-operation between school and industry, and facilitates permanent placement of students.

The diversified occupations program as it functions in St. Joseph, Mo., observes the 15-hour minimum for the working week, but provides also that the combined hours at work and school shall not exceed 40. The school instruction consists of a class in which the diversified occupations students meet with the co-ordinator for five one-hour periods weekly, and have also classes in history, English, and mathematics, along with the general student body.

Social and Civic Adjustments in Diversified Occupations Programs

The experience of many co-ordinators and investigators who are interested in young people and their working environment is that their adjustment to job and fellow workers consistently looms just as important, if not more so, than their acquisition of occupational skills. It is realized that a highly skilled worker is indeed poorly equipped if he is antisocial and does not discharge his obligations as a citizen. Waldhauser,[2] in a study of 4375 discharged workers found that positions were lost more frequently because of bad social attitudes than they were through lack of skill and technical knowledge. Stine[3] reports that in a study involving 992 employers, personality traits were given first rank among six major factors considered important in training young workers.

It was decided to investigate and record the experience of the co-ordinators of the diversified occupations programs in Missouri, and businessmen in the city of St. Joseph co-operating with diversified occupations programs. A questionnaire was developed, based upon research and personal experience, consisting of 28 items pertaining to social and civic problems of students of diversified occupations programs. Usable information was received by mail from 46 co-ordinators, and 15 employers were interviewed. The co-ordinators and employers were asked first to check the items they considered important, and secondly to indicate the 15 items which

*Adapted from Master's Report by William P. Green: "Training Units in Diversified Occupations for Aiding the Student in Civic and Social Adjustments," Colorado A. M. College, 1947

[1]Benjamin J. Novak: "Out of School Work in Industrial Education." Industrial Arts and Vocational Education. Pp. 186-187. May, 1944.

[2]Damon W. Waldhauser: "Special Report on Employer-Employee Relations." Master's thesis. 1940. Colorado State College of Agriculture and Mechanic Arts.

[3]J. Ray Stine: "Coordination in Trade and Industrial Education." Indianapolis, 1931. (American Vocational Association Bulletin No. 7).

they deemed of greatest importance. The results appear in Table 1.

TABLE 1. Selection and Ranking of Instructional Units by Co-ordinators and Businessmen

Unit	Co-ordinators No.	Co-ordinators Rank	Businessmen No.	Businessmen Rank
1. Personality	46	1	15	1
2. How to get along with people	43	6	15	2
3. What should be my attitude toward work?	36	12	15	3
4. What personal habits and attitudes will help me be successful?	44	3	15	4
5. What habits and attitudes will interfere with success?	44	4	11	12
6. Handling of money	43	5	15	5
7. Loans	6		3	
8. Credit	14		3	
9. Banking service	15		4	
10. Social Security	45	2	14	9
11. How to apply for a job	39	8	14	10
12. How to select an occupation	39	9	15	6
13. Habit formation	32	13	7	15
14. Crime	3		0	
15. Selling yourself	39	10	12	11
16. Board of health	5		0	
17. Service clubs	11		4	
18. Chamber of Commerce	4		4	
19. Community Chest	0		0	
20. Employer groups	14		4	
21. City officials	1		0	
22. Public schools	7		0	
23. Skills	20		3	
24. Taxes	27	15	8	14
25. Traffic ordinances	3		2	
26. Wage Hour Law	32	14	11	13
27. Insurance	37	11	15	7
28. Employer-employee relations	41	7	15	8
Totals reporting	46		15	

It will be noted that both co-ordinators and employers rated the same 15 units of instruction as most important. Both groups assigned first place to the topic "personality." Unit 3, *"What should be my attitude toward work?"* was ranked third by businessmen, but only twelfth by co-ordinators. This may be explained by the fact that the employer sees more directly than the co-ordinator the consequence of faulty work attitudes.

"What habits and attitudes will interfere with success?" was given fourth rank by co-ordinators and twelfth by businessmen. The difference may possibly be attributed to the desire of co-ordinators to prepare students for all situations if possible, while the employer is more likely to be interested in the student as a worker on a particular job.

As a result of the survey of co-ordinators and employers, the following list is presented of the 15 units which are the most important for civic and social adjustment of diversified occupations students:

1. Personality
2. How to get along with people
3. What should be my attitude toward work?
4. What personal habits and attitudes will help me be successful?
5. What habits and attitudes will interfere with success?
6. Handling of money
7. Social security
8. How to apply for a job
9. How to select an occupation
10. Habit formation
11. Selling yourself
12. Taxes
13. Wage-hour Law
14. Insurance
15. Employer–employee relations

Lesson Plans for Units in Social and Civic Adjustments

Lesson plans were developed for the 15 subjects ranked most important by co-ordinators and employers. They may be found useful by the co-ordinator for assignment when the need arises on the part of an individual student. This being the case, there is no recommended order for their use. The reference texts are listed in the bibliography.

Unit 1. Personality

I. Objective: To learn the value of a pleasing personality and rules which may be used in its development.

II. Read the following references before proceeding further:
- A. Author: Wheatley and Mallory
- B. Title: *Building Character and Personality*
- C. Pages: 146–168, 7–25
- A. Author: Moore
- B. Title: *Psychology for Business and Industry*
- C. Pages: 40–43

III. Answer the following questions on a separate sheet of paper:
1. List five levels of thinking.
2. Assign a value to each of the five levels.
3. List the five parts of the pyramid on page 9, Wheatley and Mallory. Check yourself against this list.
4. List 12 personality traits mentioned in pages 7–25, Wheatley and Mallory.
5. Make a list of the things you think you can do in order to improve your personality.
6. Discuss your personality with your friends and parents, seeking points of improvement.

IV. Before having your answers checked by the instructor, check them yourself.

Unit 2. How to Get Along With People

I. Objective: To learn how to improve relationships with other people.

II. Read the following references before proceeding further:
- A. Author: Dale Carnegie
- B. Title: *How to Win Friends and Influence People*
- C. Pages: 149–156, 157–170, 171–178
- A. Author: Nichols
- B. Title: *Junior Business Training for Economic Living*
- C. Pages: 78–79

III. Answer the following questions on a separate sheet of paper:
1. List those personal traits that are pleasing to other people.
2. List those personal traits that are irritating to other people.
3. Define tact.
4. Explain a tactful way of convincing a person that he is wrong.
5. Make a list of things that you can do to improve your relations with: (*a*) your employer, (*b*) your classmates, (*c*) your family.
6. How can you show your respect for: (*a*) your parents, (*b*) older people, (*c*) your school, (*d*) your job, and (*e*) yourself.
7. Why is the cultivation of good manners a privilege as well as a necessity?
8. Why has The Golden Rule never worn out?

IV. Before having your answers checked by your instructor, check them yourself.

Unit 3. What Should Be My Attitude Toward Work?

I. Objective: To learn the value of work, its relationship to advancement, and to understand how essential work is to personal development.

II. Read the following references before proceeding further:
- A. Author: American Association of School Administrators
- B. Title: *School and Manpower*
- C. Pages: 33–41
- A. Author: Wheatley and Mallory
- B. Title: *Building Character and Personality*
- C. Pages: 262–276, 217–221

III. Answer the following questions on a separate sheet of paper:
1. Why is it necessary for man to work?
2. What besides financial rewards are the advantages of having a high school education?
3. What changes should occur in the conception young people have of the value of: (*a*) the home, (*b*) the school, (*c*) the community, and (*d*) the job?
4. Define the following: unskilled worker, semiskilled worker, skilled worker, professional worker.
5. Which of the workers in question (4) are less likely to be affected by new inventions?
6. List the things you desire most out of life.
7. How can you direct your efforts toward the attainment of these goals?

IV. Before having your answers checked by your instructor, check them yourself.

(To be continued)

Selling The Graphic Arts

JOHN M. FONTANA
Somers Junior High School
Brooklyn, N. Y.

In the New York city junior high school setup, the industrial-arts department plays an important part in the daily life of the student. Not only does the industrial-arts shop provide information about industry and the worker, but also reveals the employment opportunities offered by industry; satisfies the boys' and girls' desires to create useful things; develops abilities and skills; creates hobby interests; contributes to the tastes and judgment of the prospective consumer; develops interest and ability in home maintenance; affords practice in safety related to the school, home, and industry; gives opportunity for co-operative effort in groups; and illustrates and vitalizes the academic subjects.

National Printing Education Week

With these objectives as a background, we assumed the role of an advertising agency with the thought of capturing the imagination of all the students in our school. Our industrial-arts shop, graphic arts, enlisted the club group to help make plans for a publicity campaign. After thoughtful planning, the week of January 11 was chosen, as that was the National Printing Education Week, set aside especially to honor the memory of Benjamin Franklin, the model of American printers. A week before the opening of festivities we sent letters to practically all the newspapers and trade magazines in the city, and enclosed in them printed programs, convention type tags, a "Poor Richard" bookmark, and an invitation to visit the graphic-arts shop.

When the eventful week came, our club president explained, over the school's public-address system, to faculty and students, what the purpose of National Printing Education Week was, and how it might be observed properly. In the social studies classes it proved to be a timely correlating subject. Posters were hung throughout the building, and also distributed throughout the community. Talks were delivered to various assemblies.

On Tuesday, a radio play was put on, dealing with the events, the trial, and the vindication of John Peter Zenger, in his fight for our American heritage of freedom of the press. In spite of only one rehearsal, this radio play with background music selected and handled by the young sound crew, was enthusiastically received. Here again, a lesson in American history, with such characters as Andrew Hamilton, Benjamin Franklin, and Anna Zenger, the woman sometimes referred to as the "Mother of Freedom," was presented in a most interesting fashion. On the same day, teacher escorted classes were invited to see the graphic-arts shop in action.

Wednesday, after classes, the faculty was invited to visit the shop and see an historical exhibit. Here was a display of printed samples: pages from Gutenberg's 42-line bible; the "Oath of a Freeman," the first piece of printed matter to be produced in the American colonies; priceless samples of collotype done in Japan in the nineteenth century; an oil painting of John Gutenberg examining the first sheet to be printed on a printing press from movable type, also student projects of one-, two-, three-, and four-color work; dry-point etchings; handmade paper; linoleum and wood block carving; books of many kinds; an array of magazines; and samples of multi-color printing done by the one impression method. Then tea and cookies were served. Thanks to the homemaking department we had at our disposal table cloths, cups, saucers, spoons, and a beautiful silver serving set. The boy members of the club served as guides at the exhibit and the girls did a good job as hostesses, pouring, and serving.

On the following day, the club had an exclusive showing of the sound, colored motion picture, "Magazine Magic." This was an interesting forty-minute visual lesson, which showed the students the very origin of all printed matter, from the trees to the process of making paper, machine type setting, making of printing plates, designing a page, artists at work, use of live models, and decorations for pictures, the making of ink, the operation of giant presses, and finally, the binding and mailing.

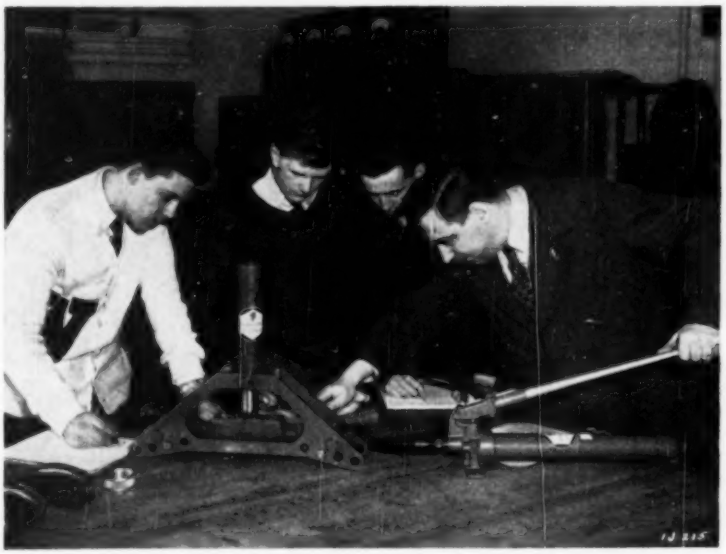
In the afternoon a representation from the club placed a large wreath of flowers at the base of the statue of Benjamin Franklin in Park Row.

Then the class took a subway train to the public library on 42nd Street and Fifth Avenue, to see an elaborate and informative printing exhibit and an original copy of the Gutenberg Bible.

On Friday, a closing talk by a student was given on the public-address system, and all classes were invited to see the graphic-arts museum in the shop.

At the end of the school day it was readily conceded that graphic arts had sold itself not only to the school but to the community at large.

It is the duty of citizenship not only to understand one's neighbors, but to make oneself understood by them—*Benson Ford*.



Showing students of electricity how to bend heavy pipe with a Blackhawk jack

Some Statements Prepared for the Vocational Teachers of Hesse, Germany

HOMER J. SMITH
Professor of Industrial Education
University of Minnesota
Minneapolis, Minn.

It is thought that readers of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will find interest in the following materials, in view of their original use and of the circumstances which prompted and modified their preparation. They were written during a recent three-month period in Germany; then translated, mimeographed, and distributed to all vocational education personnel in the German schools of Land Hesse (instructors and officials in agricultural, homemaking, industrial and commercial education). They have since been made available, in both languages, for appropriate uses throughout the U. S. Zone.

Many industrial education "specialists," and like persons representative of other curriculum areas, are spending periods of varying lengths in foreign countries in aid of our occupational and reconstruction processes. Assignments are being accepted and services are being rendered under the plans and procedures of several agencies. The writer enjoyed connection with the War Department and worked through the Office of Military Government — Education and Cultural Relations Division. About nine weeks of his time were spent in Hesse, with residence at Weisbaden.

Despite the variety of possible attachments and patterns of working conditions abroad, it may be stated that short-term persons serve as *consultants* to Americans of longer stay and continuing responsibility. Moreover, they counsel with resident or national school workers, and they assist with current educational endeavors in so far as limited orientation and understanding make possible.

There is commonly the practical request, also, that each short-term assignee will conceive some obviously needed project that he can initiate during his stay and that will be worthy of continuance under the stimulation and guidance of others. There is sufficient time to carry one such work by interspersing it with planned visitation, special aid to individuals and schools, or formal research that may have been undertaken. In addition to helping to plan and to conduct one-day regional institutes for vocational teachers in seven cities, the writer provided the materials here being presented. They were prepared as three sets or series of brief statements about Vocational Guidance, Vocational Education, and Vocational Teacher Training.

These sets of *Briefs* appeared to be necesary and proved to be helpful for several related reasons. German educational workers are more concerned than comparable persons in our country as to philosophies and consistent practices. Books and journals of professional kind, or of any other kind, are very scarce in the schools, the general libraries, and the homes. Germans greatly desire to know what we are thinking and doing in any given field, because such information has lagged and because, for a long period, more immediate interests have demanded full time and attention. Most school workers cannot read materials in our language with satisfying ease and result. Yet, so great is their eagerness with reference to our theories and activities that personal chats and group conferences, even when well interpreted, tend to be skippy and changeful without some written base. The setting down of fundamental concepts and implementing details, about matters of interest to both parties, brought more frequent and more direct questions and provided points of beginning for discussions.

Present readers will have varying reactions to the materials that were selected to be offered and to the form of their presentation. Other visitors, under the same urge, would have distributed something different and something equally effective. The factors which largely controlled the project here reported were: (*a*) review of what had been envisioned or accomplished by German leaders of the past, (*b*) acquaintance with plans of German officials and of their American helpers in the present and for the future, (*c*) immediate needs that appeared and seemed to change with the passing of weeks and the broadening of contacts, (*d*) desire that some of our more democratic school aims and methods be made conveniently subject to comparison and evaluation, and (*e*) decision to use terse statements that would permit of the clearest possible translation.

A. Vocational Guidance Briefs

I. *Some Reasons for Vocational Guidance in Schools*

1. Young people are not all alike. They differ in numerous ways. They do not understand what these differences are. Therefore, they cannot choose their occupations wisely and the schools must help them.

2. Society requires people who have different abilities and interests. There are many types of work that need people who can do them in the best way. There are also kinds and levels of civic responsibility.

3. A high percentage of young people do not make proper life adjustment. Assistance in selecting occupations is greatly needed. This help must be based upon facts concerning individuals and types of employment. The schools must discover these facts and see that the children learn them.

4. There are thousands of jobs and positions for which proper persons must be found. The number steadily increases. This makes it more difficult for young people to decide what to do in life and how to get ready to do it.

5. We conserve *natural* resources — coal, oil, forests — and we should make equal effort to conserve *human* resources. When talent and energy are wasted the State is cheated, as well as the persons concerned. We must not throw away valuable things.

6. Progress of the whole people depends upon the efficiency of each worker, regardless of the kind of work he does. High efficiency comes only by means of good choices of careers and good preparations for them. The first requirement for all boys and girls is to make proper choices — to select the right occupations. They cannot do this alone.

7. One cause of social unrest is that many people are working *above* or *below* their natural levels. If more people can be properly adjusted, we shall have happier workers and better citizens. Good working morale breeds good social morale.

8. Good matching of persons with jobs means greater production, less waste, fewer accidents, and lowered turnover. These things, in turn, mean prosperity. Good matching helps both the worker and his employer. The people as a whole get more of the things they need and get them cheaper.

9. Parents become constantly less able to assist their sons and daughters in choosing types of work. The schools must assist more each year, but the parents must co-operate.

10. The function of schools is not to make pupils alike. The schools must discover the pupils' differences and make it possible for each one to attain his best station in life. This is the highest purpose and opportunity that the schools have.

II. *Some Special Considerations*

1. Guidance does not mean dictation. We should not assign boys and girls to jobs. Each young person should be free to make his own occupational choice. This choice should be made in view of personal and economic facts, and with the assistance of parents, teachers, and vocational counselors.

2. The goodness and value of vocational guidance in any school depend upon how much all of the teachers know about guidance and how much they co-operate for the benefit of youth. Teachers should take vocational guidance courses.

3. Vocational guidance work is concrete and specialized. The activities of guidance workers are definite. Preparation must be arranged for those who plan to give full time or part time to this kind of schoolwork.

4. The school is society's best agent for doing guidance work. Other nonschool agencies should be led into co-operation. The schools cannot succeed alone but they should assume full responsibility. They should seek and coordinate the aid of other local and state groups or associations.

5. The placement of boys and girls in available jobs does not constitute a vocational guidance program. It is only one phase or part of such work. Effective service to young people includes vocational counseling, vocational training, placement in jobs, follow-up on the jobs, and subsequent adjustment if that seems best.

6. Guidance cannot be done finally, at a certain time, for a certain individual. It must become a rather continuous process, reaching up into the adult lives of people if that becomes advisable.

7. We have long known that vocational guidance and vocational preparation are interdependent and complementary. Each improves the other. We have now come to see that they are mutually causal. One breeds or induces the other, as well as improving the other. They belong together. Teachers and school administrators must understand both guidance and training and plan to keep them unified.

III. *School Administration Features with Guidance Value*

1. Measurement of general intelligence
2. Measurement of special aptitudes
3. Measurement of subject accomplishment
4. Inventory of interest patterns
5. Differentiated curricula
6. Ability grouping
7. Grade or half-grade skipping
8. Supervised study
9. Investigation of home conditions
10. Special classes for low-ability students
11. Special plans for gifted students
12. Increased reading materials
13. Socialized recitations
14. Student organizations
15. School physicians, dentists, nurses
16. Mother's clubs and parent-teacher groups
17. Student loans and scholarships
18. Increased reading of biography
19. Comprehensive courses — general mathematics, general science, general shopwork, general social studies, etc.
20. Concept of the junior high school
21. Visits to higher or special schools
22. Home-room teacher systems
23. Use of analysis to determine course content

IV. *More Direct Guidance Procedures*

1. Guidance included in all courses
2. Lectures by staff members, on specific occupations
3. Vocational lectures by prominent citizens
4. Educational field trips to see people at work
5. Expressions of choices and comparisons with census data
6. Case histories, with suggestive discussions
7. Interviews with successful adults
8. Scheduled sessions with counselors
9. Use of self-analysis blanks
10. Courses in occupations
11. Reading of occupational descriptions
12. Exploratory courses, by fields — agriculture, industry, music, physical education, homemaking, commerce, art, and new areas
13. Courses on vocational ethics
14. Special occupational rooms in libraries
15. Use of vocational co-ordinators
16. Specific aid to students soon to leave school
17. Supervised vacation employments
18. Supervised part-time work for wages
19. Constantly improved guidance records
20. Use of guidance workbooks
21. Group conferences and seminars
22. Occupational surveys to determine quotas
23. Use of guidance handbooks
24. Use of guidance films
25. Child guidance clinics for cities
26. Attention to parents' wishes
27. State supervisors of apprenticeship
28. State and city supervisors of guidance
29. Guidance associations and journals
30. Workshops and conventions for guidance workers
31. Promotional activities to inform the public
32. Research activities as a basis for the programs

V. *Fifty Ways in Which Occupation Differs*

1. Local, regional, national, or world-wide
2. Growing or declining as work fields
3. Unified or breaking into specialties
4. Crowded or needing recruits
5. Steady or seasonal employment
6. Race or creed discrimination
7. Clearness of promotion route
8. Physical strain or hazard
9. Speed, accuracy, dexterity, skill
10. Social sense, business judgment
11. Appearance, poise, tact
12. Satisfactions other than money
13. Work with people or things
14. Activities in the daily work
15. Entrance levels and seniority
16. Turnover by age groups
17. School subjects most useful
18. Manufacturing or distribution
19. Construction, assembly, repair
20. Level of public service
21. Ease of transfer to other occupations
22. Common annual income
23. Fluctuations of income
24. Type of working associates
25. Provision for vacation time
26. Sex competition ratio
27. Value of individuality
28. Manner, voice, defects
29. Rural or urban location
30. Varied or repetitive
31. Value of versatility
32. Sedentary or active
33. Method of securing job
34. Juvenile or adult
35. Special attractions
36. Objectional aspects
37. Manual or mental work
38. Legal protections
39. Insurance status
40. Exploitation of youth
41. Per cent of failure
42. Amount of formal education
43. Nature of supervision
44. Nature of the work place
45. Outdoors or indoors
46. Sitting or standing
47. License, certificate, etc.
48. Equipment to be owned
49. Security and retirement
50. Money needed to begin

(To be continued)

BUILDING CODE REQUIRES SAFETY MARKERS THAT GLOW IN THE DARK

The building code of the city of Hartford, Conn., requires that all public buildings be equipped with exit signs which will continue to glow for at least one-half hour after lights fail or are cut off. — *The New Jersey Zinc Co.*

The Galveston tidal wave of 1900 is the greatest recorded catastrophe, claiming 6000 lives. Only six other catastrophes have taken more than 1000 lives — the Johnstown flood of 1889, the sinking of the Titanic in 1912, the explosion of the Sultana in the Mississippi river in 1865, the burning of the General Slocum in the East River, N. Y., in 1904, the Peshtigo, Wis., forest fire of 1871, and the Florida hurricane of 1928. — *National Safety Council.*

Problems and Projects

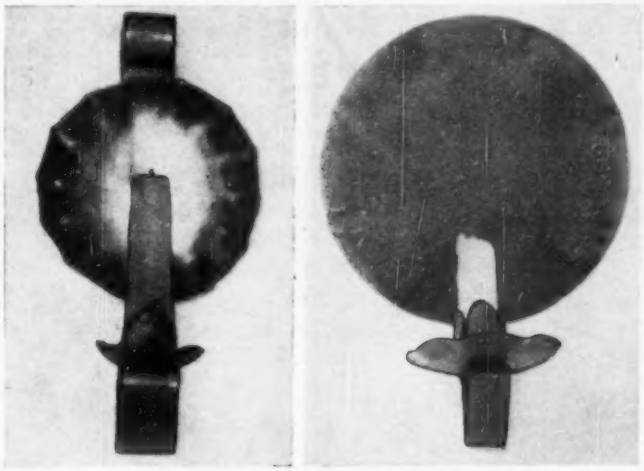
SIMPLE NEW ENGLAND WALL SCONCES

VINCENT P. CONNERS
Supervisor of Handicrafts
Special Class Department
Boston, Mass.

The romantic story of lighting in America is most delightful. From the old Puritan Betty Lamp up to the sconce, we see the use of cow, deer, and bear tallow, whale oil, spermaceti, wax from the honeycombs of wild bees, and a substance obtained from the boiling of bayberries. Later, we see the use of chicken fat, lard oil, and camphene. Candlewood (pitch pine chips cut about the size of a candle), cat-o'-nine-tails, rush, pith, or cane soaked in grease, were also found very effective at different stages of the development of lighting. Later we come to the candle stage where we see candles held in every possible manner and finally in beautiful candlesticks and wall sconces.

There are two lamps that were being used in Colonial days when sconces were very popular. The first was the courting lamp. When a young gentleman arrived at his fiancée's home to take possession of the parlor for the evening, father would appear with a newly filled courting lamp just lit — and when the lamp went out, the gentleman was expected to do likewise.

The second lamp was the sparking lamp used by innkeepers. When a guest was ready to retire, he would be given a sparking lamp which would only burn a short time. Then the innkeeper did not have to worry about the length of time the light was burning.



New England wall sconces A and B

Old New England Wall Sconce
Figure A

Both of the sconces shown have been copied from very old New England pieces and may be reproduced in tin (this was the material used in the originals), copper, or brass.

Materials necessary for a pair:

Reflector: 2 pieces, 4½-in. diameter
Support: 2 pieces, 1 by 14½ in.
Drip cup: 2 pieces, 2-in. diameter
Candleholder: 2 pieces, 2-in. diameter, four (4) ½-lb. galvanized flathead rivets (if reproducing in copper or brass use rivets of that same material).

Tools: Snips, hammer, nail, file, dividers, rule.

Procedure:

A. Cut and file circles for reflectors (4½-in. diameter).

B. Divide circumference into 14 equal parts and flute your reflector at these points by hammering metal into a small groove that has been filed into a piece of wood.

C. Make hole in center of reflector large enough for rivet (use hammer and nail).

D. Cut and file metal for drip cup. Make hole in center for rivet and flute.

E. Cut and file metal for candleholder, and make hole for rivet and shape as a rosette.

F. Cut and file piece of metal, flare ends if desired, and come in from one end ¾ in., and make a hole for the rivet that will hold the drip cup and rosette.

G. Assemble these and rivet.

H. Now center reflector on the support, mark for rivet, make hole, and complete riveting operations.

I. Make little wire loop, and attach to back for hanging.

J. Finish with steel wool, paint, or polish, then lacquer.

Old New England Wall Sconce
Figure B

The original material for this was tin and these make fine projects either for the tin can unit or for the art metal unit. We find even in the original the support being so light that the weight of the candle has the tendency to pull this out of shape, and walking across the floor would cause the candles to sway. We may correct this in two ways: (1) double the back support when using tin, and a heavier gauge when using other materials; (2) solder the back edge of the drip cup to the very bottom of the reflector.

Materials necessary for a pair:

Reflector: 2 pieces, 8-in. diameter
Support: 2 pieces, 1 by 14 in.
Drip cup: 2 pieces, 4-in. circles
Candleholder: 2 pieces, 4-in. square or circles, six (6) 1½ lb. galvanized flathead rivets

Tools: Snips, hammer, nail, dividers, file, rule.

Procedure:

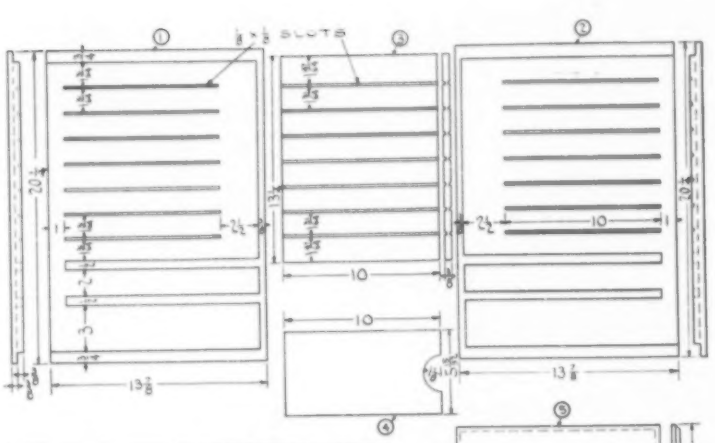
The procedure, except for a change in the dimensions is the same as in the first sconce up to the time of assembly. The drip cup and candleholder are placed on one end of the support, and the reflector is placed against the other end which comes just past the center of the reflector. Two rivets an inch apart are used to fasten the reflector and the support together. As shown at *B*, the back support does not come up over the reflector as it did in the sconce shown at *A*. Sconce *B* is given a finish similar to the one applied to sconce *A*.

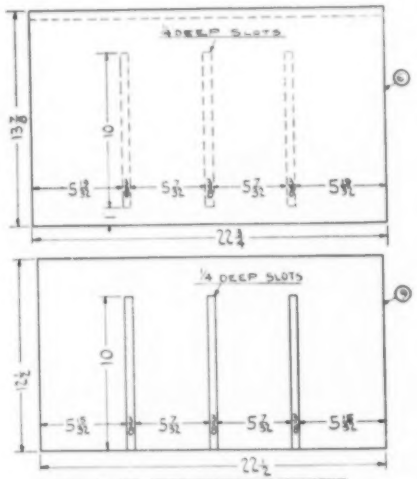
These sconces are a contribution of old New England to any progressive, modern course in tin can craft, sheet-metal work, or art metal work.

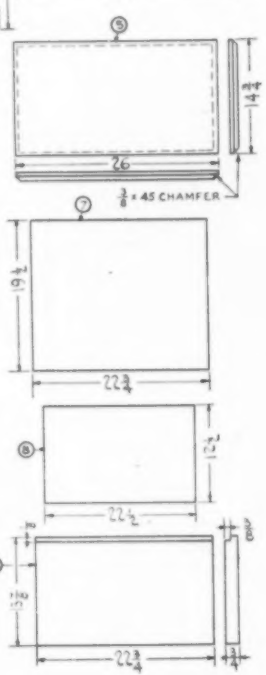
INSTRUMENT CABINET FOR THE DRAFTING ROOM

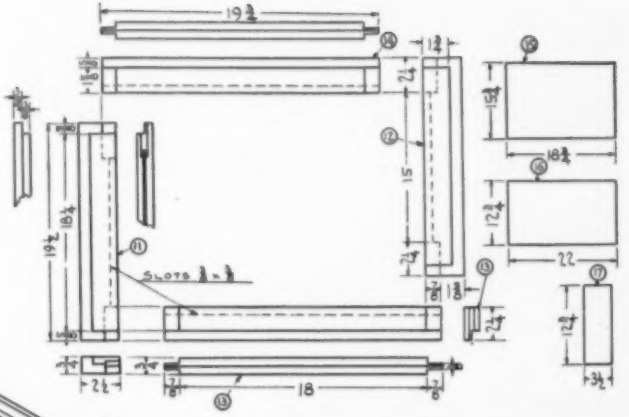
F. N. NEWTON, JR.
Supervisor of Industrial Education
Sharon City Schools
Sharon, Pa.

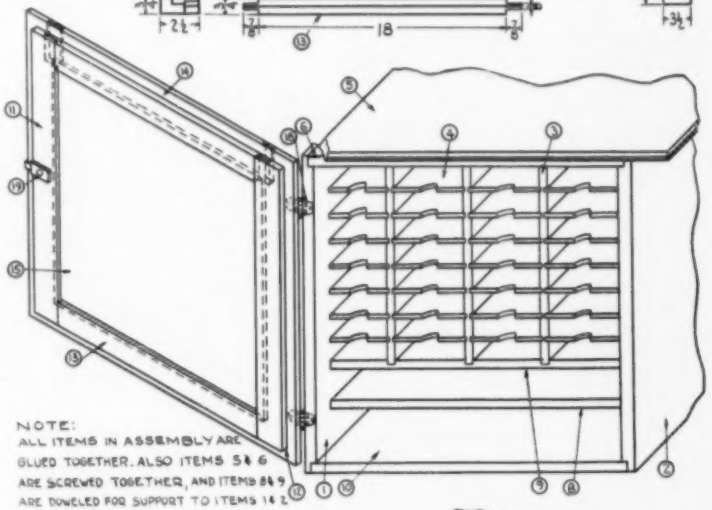
I believe there are very few drafting teachers who haven't had considerable trouble with equipment disappearing due to theft. This applies especially to parts of the sets of instruments. The writer tried various methods of checking without too much success until he



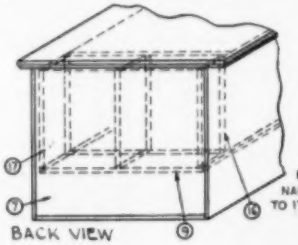








NOTE:
ALL ITEMS IN ASSEMBLY ARE GLUED TOGETHER. ALSO ITEMS 5 & 6 ARE SCREWED TOGETHER, AND ITEMS 8 & 9 ARE DOWELED FOR SUPPORT TO ITEMS 1 & 2



NOTE:
NAIL ITEM 17 TO ITEMS 7 & 16

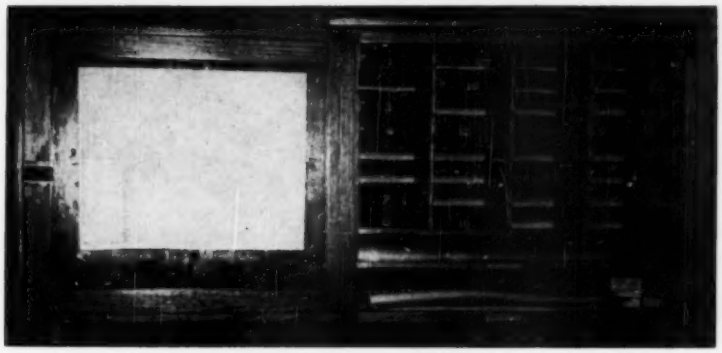
BILL OF MATERIAL

ITEM	MATERIAL	NO REQD
1	3/4 x 13 3/8 x 20 1/4 OAK LUMBER	1
2	3/4 x 13 3/8 x 20 1/4 " "	1
3	3/4 x 10 x 13 1/4 " "	3
4	1/8 x 5 5/32 x 10 FIBER BOARD	28
5	3/4 x 14 3/4 x 26 OAK LUMBER	1
6	3/4 x 13 3/8 x 22 3/4 " "	1
7	3/8 x 19 1/2 x 22 3/4 " "	1
8	1/2 x 12 1/2 x 22 1/2 " "	1
9	1/2 x 12 1/2 x 22 1/2 " "	1
10	3/4 x 13 3/8 x 22 3/4 " "	1

BILL OF MATERIAL

ITEM	MATERIAL	NO REQD
11	3/4 x 2 1/2 x 19 1/2 OAK LUMBER	1
12	3/4 x 2 1/2 x 19 1/2 " "	1
13	3/4 x 2 1/4 x 19 3/4 " "	1
14	3/4 x 2 1/4 x 19 3/4 " "	1
15	3/8 x 15 3/4 x 18 3/4 " "	1
16	1/4 x 12 3/4 x 22 PLYWOOD	1
17	3/4 x 3 1/2 x 12 3/4 PINE	3
18	HINGES (MEDIUM SIZE)	2
19	LOCK	1

Details of drafting-instrument cabinet



Drafting-instrument cabinet

decided to have the cabinet built which is illustrated and described herewith.

At the close of each period now, the teacher stands at the cabinet and checks each set as it is brought to him. Then he places it in the pigeon hole marked with the same number as that which appears on the instrument box. This number also corresponds to the number of the drawing table the boy is using.

By using this system, if the teacher checks the instruments accurately, there will be no parts missing and an accurate check is had on the equipment in the sets at all times.

The cabinet has two large spaces, one for unused drawing paper and the other for finished drawings that have not been corrected. Due to the depth necessary for housing the drawing paper, it is necessary to put in a false back behind the instruments so that the ends of the boxes will approximately flush with the front of the cabinet.

On the door of the cabinet is placed a roster of all students taking drawing in each period. It is an easy matter when an instrument set isn't turned in to look at this roster and see who the student is who is negligent.

In building the cabinet it is well to make the slots large enough so that most ordinary sizes of instrument cases will fit without any trouble.

The cabinet can be fastened to the wall or set on some type of stand so that it will be convenient to use.

We have three drawing rooms in our industrial department and all drawing rooms are equipped with these cabinets. Because of this the loss of equipment over a period of years has been practically nil.

Pupil-teacher planning is not only preparation for democratic living, it *is* democratic living. — *From Teaching Progress, Milwaukee Public Schools.*

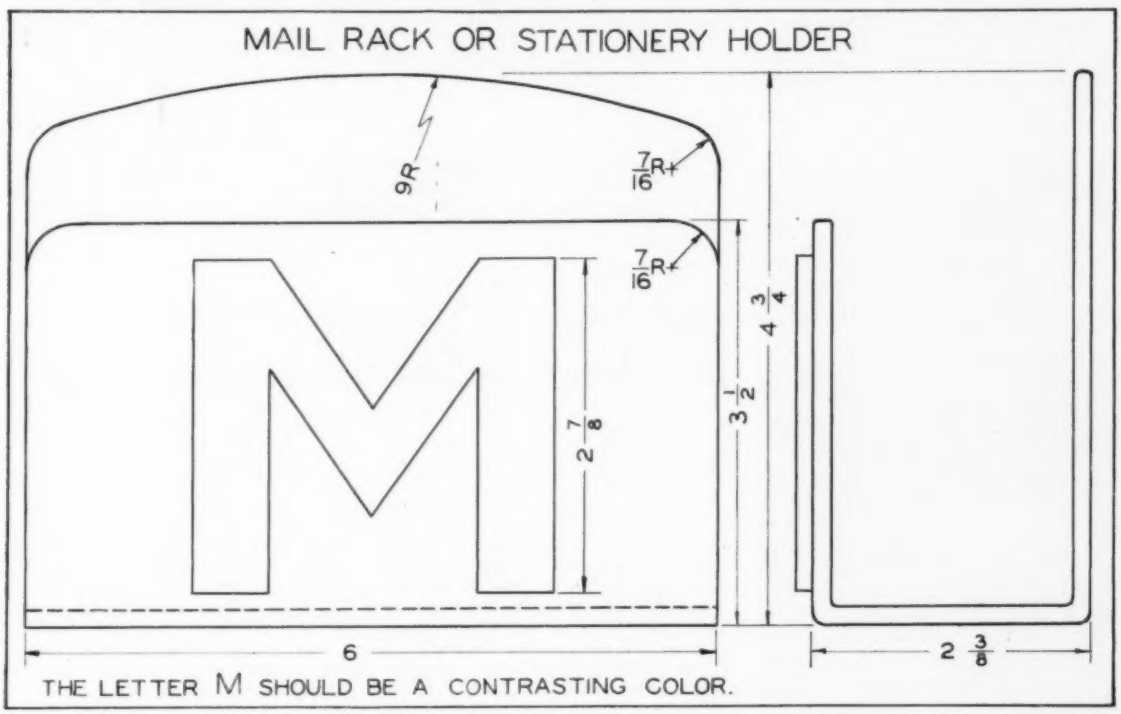
LETTER RACK

P. S. BURNS
James Madison Junior High School
Seattle, Wash.

The letter rack described in this article is very convenient for uses other than for holding letters, as it makes an excellent holder for paper napkins, newspapers, etc.

The project is attractive and very easily made. Various colors should be used and they should be selected to suit the surroundings. The curve on top should be cut before heating and bending.

Material required:
1 pc. ⅛ by 6 by 11-in. plastic.
1 pc. ⅛ by 2⅞ by 3¼-in. plastic.



Letter rack submitted by P. S. Burns

INDIAN SILVERSMITHING

BEN HUNT
Holes Corners, Wis.

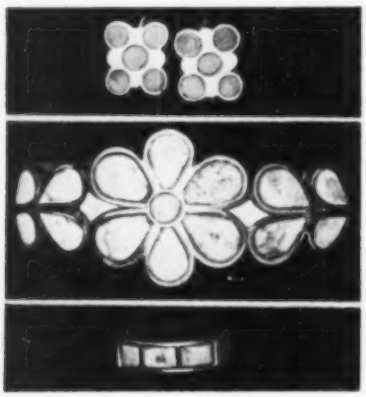
(*Continued from page 131 of the March, 1949, issue*)

Channel Work

Channel work is a new phase in Indian silversmithing. About 1928 it made its first appearance but the traders were somewhat skeptical about it and discouraged the Indians from making it. As good turquoise became more scarce, the Indians again started making channel work, and about 1946 some of the traders bought a few pieces and found that it had a ready sales value. At the 1948 Gallup Ceremonial, there was about as much channel work as other silver work, and some of it was very beautiful. It is all pretty as far as that goes, but it seems that the Indians can do more in channel setting than with the cabochon cut stone.

For channel work the Indian buys chips and small flat fragments of turquoise which are easily ground to shape. These fragments were not so easily disposed of formerly by the traders as much of it was quite thin. In Plate 11 of the November, 1947, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is shown how a thin polished piece of turquoise can be cemented to a piece of phonograph record to give it more height. In channel work this can readily be done and consequently even the thinnest fragments can be utilized. There is also a lot of simulated turquoise being thrown on the market. This has a beautiful deep color, and although it is an imitation, the price is the same as the genuine. This imitation turquoise can usually be detected by its coloring which is too even and too perfect. It is the slight variations in color of turquoise and the slight unevenness of the silver work that makes Indian jewelry what it is.

Plate 35 shows a flat ring at the upper left-hand corner. It also shows how the setting is soldered up. The outer rim is shaped first, in this case with sharp corners, and then the two long dividers are fitted and then the six short dividers. It takes quite a bit of filing and fitting. The box, or housing as some Indians



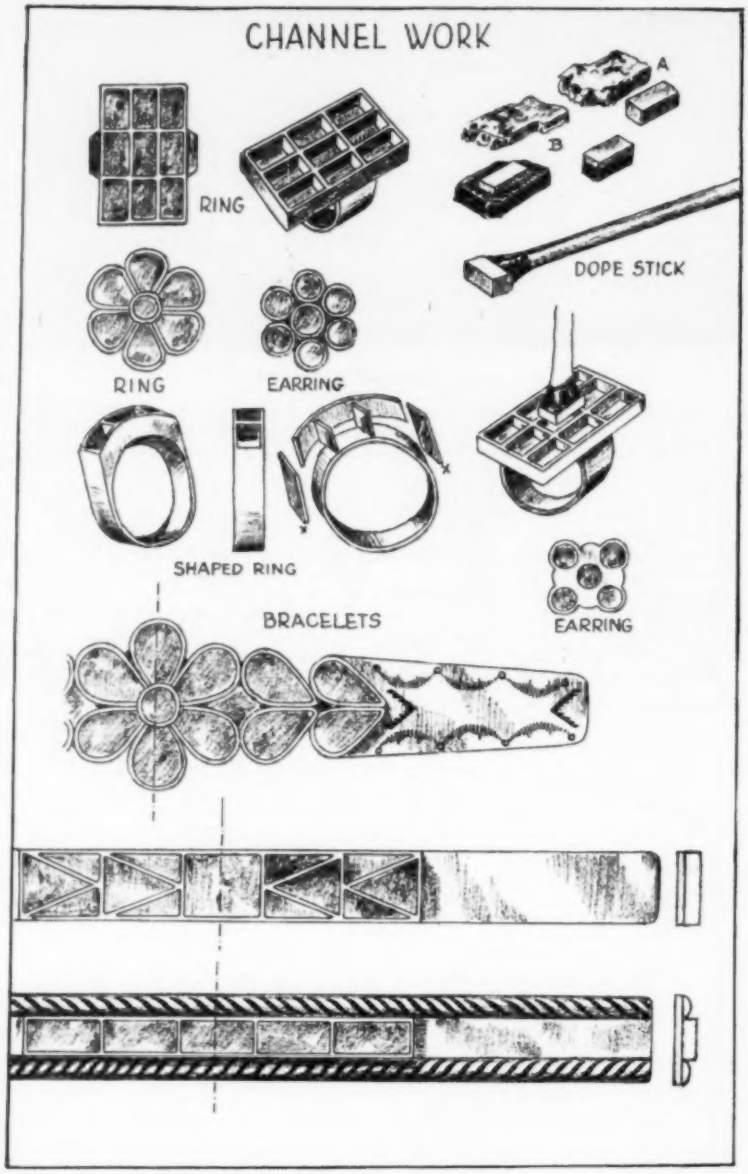


Plate 35

call it, is then soldered and the band soldered to it. The stone may be cut with a sandpaper stick or on a carborundum wheel. A dope stick should be used for holding the stone, because that is much safer than trying to hold it with the fingers. Get some skewer sticks from the butcher to make small dope sticks, and whittle out the larger ones. Flatten the good side of the stone first and fasten that side to the stick with sealing wax. Now comes the finicky part, that of grinding it to shape on a carborundum or silicon wheel. Fit the stone as shown in the sketch below the dope stick. If the turquoise is thick enough for the housing it will look like at *A*. If it is a thin piece, press it into a heat softened piece of phonograph record and let it cool. Then cement the two together with DuPont Cement and while that is drying, proceed with the next piece. After the cement is dry, file the stone to shape, trying it fre-

quently for size. Try to get a snug fit, and the top or face of the stone should be above rather than below the housing. When the proper fit has been obtained, put some cement on the stone, push it down in place, and let it dry. When *all* the pieces are set, grind off the entire face carefully, down to the channels, and taking off a little of the silver. The finished grinding should be done with a piece of medium grit carborundum or alundun cloth tacked to a piece of wood. Sometimes the grinding pulls the silver over the stone enough to hold it securely, but sometimes a burnisher must be used to slightly flatten or spread the edge of the housing. The housing which is in reality the bezel, is not crimped over the stone as in other settings.

In the shaped ring another method is followed. The two end pieces marked *X* are filed where they fit onto the band. The shaping and fitting of the stones is quite tricky in this case. The flower shaped ring and earring are self-explanatory. The lower earring was made of five round housings and four flattened raindrops set between the outer housings. Then a lot of solder was used, and after it was all ground down there was no evidence of the rings except where shown on the outside.

The bracelets are all soldered up flat, and then slowly shaped before the stones are set. Note that the ends are flat beyond the housings except for the lower one which has a half-round rope wire soldered along the edges.

Personally, I like channel work but I would rather buy it than make it. One must have infinite patience to cut stones for a large piece. In other words, I'll solder the job if someone else will cut and set the stones.

PLASTIC MIRROR WITH ORNAMENTAL BACK

SIMON S. PALESTRANT
Bronx, N. Y.

A very interesting and novel mirror may be made of plastic rod, a round, beveled mirror and an embedded butterfly. A 5-in. mirror for this project can be bought at any luggage or handbag shop. A piece of half-inch polystyrene or acrylic rod is cut to 32-in. length and held ready for shaping. See Figure 1.

A jig is made as shown in Figure 2. The mirror is laid on the rest block while the center of the plastic dowel is clamped between the mirror and the back head block. The rod is then heated and pressed around the mirror toward the front. If sufficient pressure is applied, the mirror edge will cut a groove into the rod which will act as a rest slot for the mirror later. See Figure 3.

To apply heat to the particular section of the plastic rod, use a heating unit in a reflector, such as an electric broiler lid to control the heating area. When it reaches the proper softness, bend the rod about the mirror, and pin the two ends close together with the adjustable wedge blocks. Anchor them until they are completely cool. Be sure that the pieces which form the handle are aligned in correct position alongside each other.

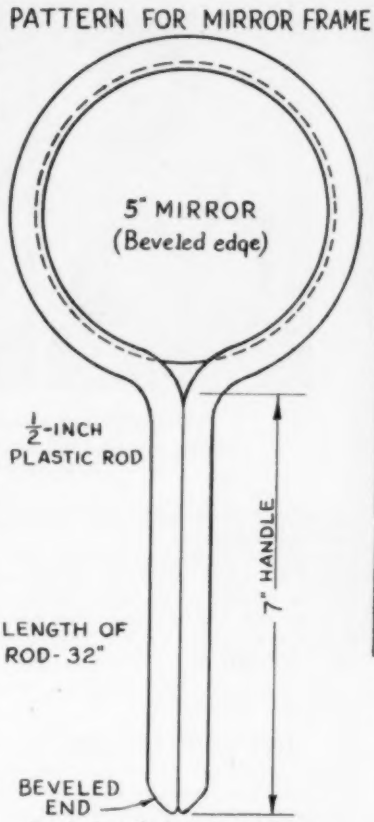


Fig. 1. Detail of plastic rod frame for mirror

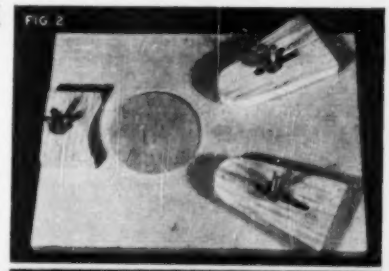
Cement the handle pieces together in a wet bond using a solvent type of cement. Any of the hydrocarbon group or commercial solvents will do. Release the mirror from the jig when the cement is firm. See Figure 4.

To make the butterfly back, it is necessary to prepare the insect properly although one may be bought at any standard scientific supply house. After the butterfly is caught, it is placed into a jar covered with a lid. This lid should have a wad of cotton which has been soaked in carbon tetrachloride ("Carbona" or CCl_4) taped to its underside. This will kill the insect before it can damage its wings. See Figure 5.

Lay the dead butterfly on a pin board. Anchor the wings flat with strips of paper used as stretchers and allow it to remain in this position overnight. It will then be permanently pressed. See Figure 6. Pieces of glass, such as specimen slides, will act as stretchers as well. After it is dried, the butterfly is ready to be embedded.

Prepare the casting resin[1] by adding the proper amount of hardener to it, as shown in Figure 7. Directions as well as the catalyst is

[1]Castolite — The Castolite Corporation, Kenilworth, Ill.



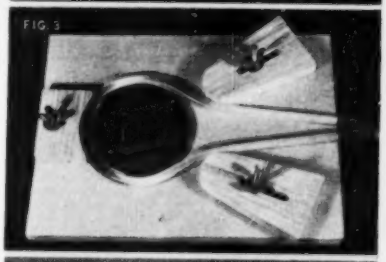


Fig. 2. Jig for forming mirror frame

Fig. 3. Heated rod being formed in the jig

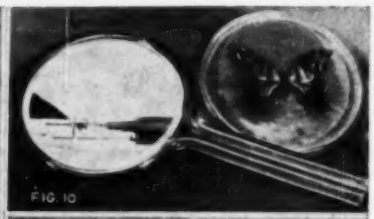
Fig. 4. The assembled mirror and frame

Fig. 5. Killing the butterfly with carbon tetrachloride

Fig. 6. Fastening the butterfly on a stretcher for drying

Fig. 7. Preparing the plastic resin for casting

Fig. 8. Embedding the butterfly in the resin



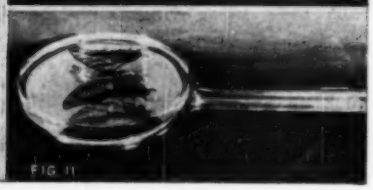


Fig. 9. Heat treating the resin disk with the butterfly

Fig. 10. The resin disk ready to be attached to the mirror

Fig. 11. The finished mirror

usually supplied with the purchase of the liquid plastic. Prepare just enough to give you a thin layer (about ⅛ in.) in a 6-in. Petri dish. Pour it gently into the dish so that no bubbles are formed in the process. Allow this to stand for about four to six hours in a clean, dustproof spot. A chemical change will take place which will change the plastic from the *A*, or liquid resin stage, to a *B*, or jellied resin stage.

When this has taken place, place the butterfly down on the surface gently. The jellied surface is now sticky and will anchor the insect firmly.

Pour freshly prepared resin into the Petri dish until it covers the entire thorax of the butterfly. See Figure 8. Allow this to stand until it too has jellied.

In order to finish the hardening process, the dish should be placed into a box, incubator, or any other heating device which will gradually raise the temperature to about 170 degrees F., and keep it there for about four hours. See Figure 9. Even heat application is important as well as a very gradual cooling. This will avoid internal fracturing set up by complex strains and stresses. When the embedment has cooled to room temperature, you will find that it has shrunk sufficiently to slip out of the dish. You may have to scrape a few edges where the resin has overflowed and caused burrs to appear.

Level off and polish the back surface of the casting. Graded emery, sand, or garnet paper down to 7/0 or 9/0 will do the job. Follow this with crocus cloth, then buff lightly with tripoli compound and jeweler's rouge until a high gloss has been obtained. The polishing may be stopped at the 9/0 sanding stage, if a dull matt finish is desired.

Attach the embedded butterfly block to the back of the mirror. See Figure 10. Check the joint for closeness of fit, hold it firmly in place, and apply a liquid cement[2] to its edges. Allow it to stand until it is firm. Then polish lightly. See Figure 11.

[2]A solvent, wet bond may be used — any of the hydrocarbons (ether, tuluene, chloroform, etc.).

LESS LIGHT REQUIRED

The eye needs less light for work involving fine details than it would get under standards now recommended by the Illuminating Engineering Society, according to a study made by the Laboratory of Physiological Hygiene of the University of Minnesota and reported in the April issue of the *Journal of the Optical Society of America.*

It was found that the high levels of illumination, held to be desirable by the illuminating engineers, actually may impair the efficiency of visual work. They declare in the *Journal* article that "much previous work on the relation of illumination intensity to visual performance and visual fatigue is unsatisfactory in regard to approach, technique and experimental and statistical evaluation."

"Levels of illumination for various jobs," say the Minnesota scientists, "have been recommended without a proper basis."

The *Journal* article reported that the ideal intensity of illumination was found to be considerably lower than that recommended in current lighting codes, 100 foot-candles sufficing where 300 to 500 were suggested by illuminating engineers.

Six men worked on the Minnesota research, principally Ernst Simonson, M.D., and Josef Brozek, Ph.D., under the general guidance of Dr. Ancel Keys, director of the Laboratory of Physiological Hygiene. Simonson and Brozek signed the article appearing in the optical journal. The studies were aided by a research grant supplied by the Verd-A-Ray Corporation, Toledo, Ohio, independent electric lamp manufacturers, as a result of increasingly severe criticism of recommended high illumination levels.

Simonson and Brozek in the Minnesota research confirmed the remarkable adaptability of the eye to varied lighting levels, leading to the statement that "in general, illumination engineers tend to exaggerate the effect of variations in the illumination level."

The paper cited thirty-five studies, many from famous research centers. Included was a paper on Illumination Standards written by Dr. Miles A. Tinker, professor of psychology at the University of Minnesota, who concluded: "The trend seems to be to specify as high intensities as the traffic will bear and at the same time warn the consumer that if he uses still higher intensities, he will improve his ease of seeing. All will agree that there should be sufficient light for adequate seeing. It is high time, however, that the consumer know what is adequate and what is surplus."

A MACHINIST'S VISE

D. E. KELLOGG
Technical High School
Erie, Pa.

Every drafting instructor has his own pet vise. Mine is the vise described in the accompanying illustrations. It was developed by the drafting trade students of the Erie Technical High School, as a design project.

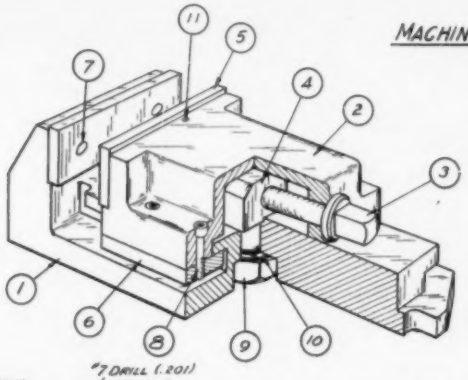
The basic features considered in the design were as follows:

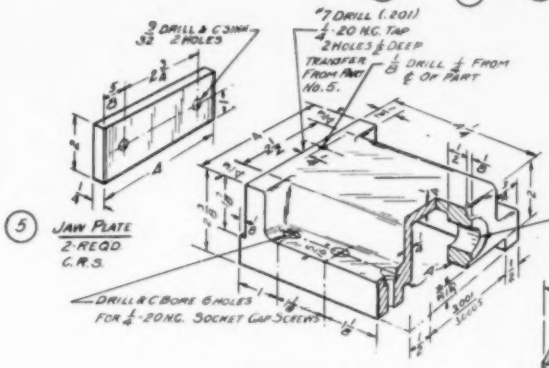
a) The capacity of the vise shall be 4-in. wide jaws which will open 2 in.

b) The clamping pressure exerted by the vise screw shall be applied to the movable jaw at a point opposite the center of the jaw plate.

c) The pressure screw shall be provided with 6 acme threads per inch and be ¾ in. in diameter.

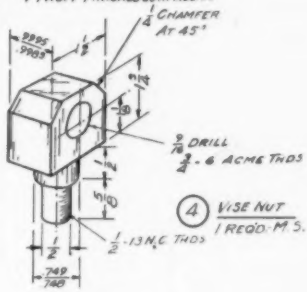
MACHINIST'S VISE




"7 DRILL (.201)
1/4-20 N.C. TAP
2 HOLES 1/2 DEEP
TRANSFER FROM PART No. 5.
DRILL & C'SINK 2 HOLES
DRILL & C'BORE 6 HOLES FOR 1/4-20 N.C. SOCKET CAP SCREWS
.750 REAM NEAR END
.500 REAM FAR END
1" FROM FINISHED SURFACE A

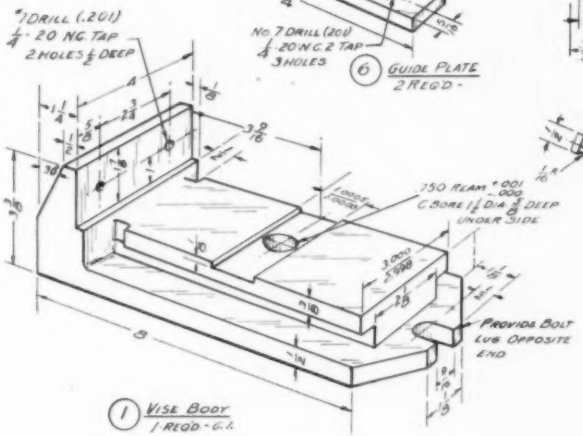
(5) JAW PLATE
2 REQ'D
C.R.S.

(2) MOVABLE JAW
1 REQ'D - C.I.

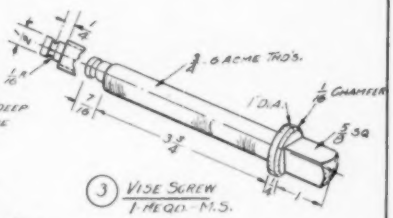


(4) VISE NUT
1 REQ'D - M.S.

(6) GUIDE PLATE
2 REQ'D.



(1) VISE BODY
1 REQ'D - C.I.



(3) VISE SCREW
1 REQ'D - M.S.

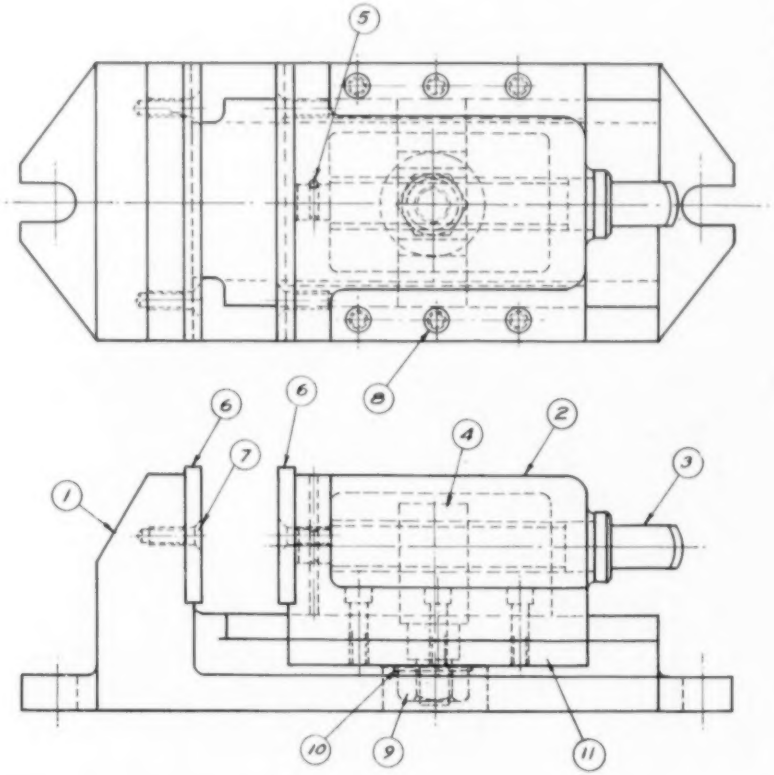
(7) FLATHEAD MACHINE SCREW
1/4-20 N.C. - 1/2 LONG - 4 REQ'D - STEEL

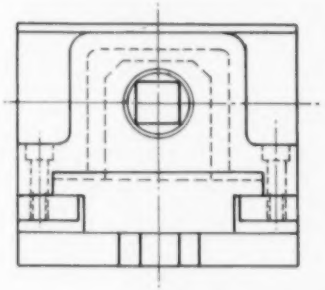
(8) SOCKET HEAD CAP SCREW
1/4-20 N.C. - 1" LONG - 6 REQ'D. STEEL

(9) NUT - STD HEX. - 1/2-13 N.C. TAP
1 REQ'D. - STEEL

(10) NATIONAL LOCK WASHER 1/2"
1 REQ'D. - STEEL

(11) PIN - .125 DRILL ROD 2" LONG
1 REQ'D.





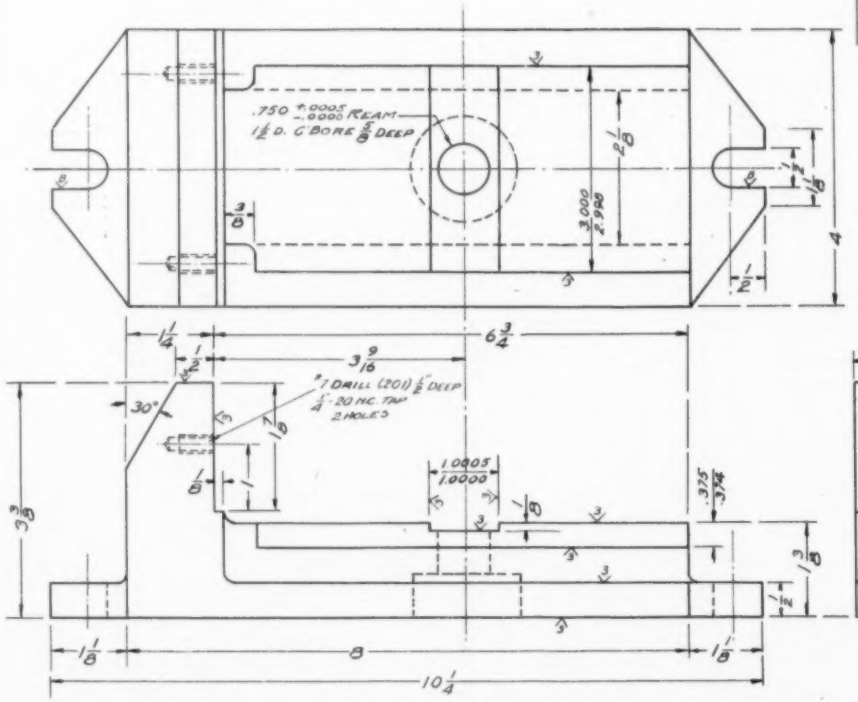
MATERIAL LIST					
ITEM	REQD	PART NO.	NAME	MATERIAL	DESCRIPTION
1	1	60071-1	FIXED JAW	C.I.	
2	1	60072-1	MOVABLE JAW	C.I.	
3	1	60072-3	VISE SCREW	STEEL	1" DIA. 5 3/16 LONG
4	1	60072-4	VISE NUT	STEEL	1" x 1 1/2" x 2 13/16
5	1	60070-5	PIN	DRILL ROD	1/8" DIA. 2" LONG
6	2	60071-2	JAW PLATE	C.R.S.	1/4" x 2" x 4" CYANIDE
7	4	60070-7	SCREW	STEEL	1/4"-20 N.C. - 3/4" LONG FL. HD.
8	6	60070-8	CAP SCREW	STEEL	1/4"-20 N.C. - 1" LONG - SOCKET HD.
9	1	60070-9	NUT	STEEL	5/8"-13 N.C. STD. HEX.
10	1	60070-10	NAT. LOCK W.	STEEL	5/8" - NAT. LOCK WASHER
11	2	60072-3	GUIDE PLATE	STEEL	5/8" x 1 1/16" x 4 13/16"

NOTE
1.- MAXIMUM JAW OPENING 2"

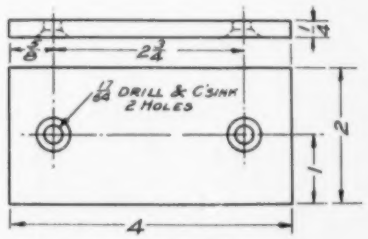
TITLE MACHINIST'S VISE ASSEMBLY		
MATERIAL NO REQD	DWN BY W.E.T. DATE 10-14-48	
TECHNICAL HIGH SCHOOL ERIE, PENNSYLVANIA	ASSEMBLY NO. 60070	DRAWING NO. 60070

MATERIAL LIST

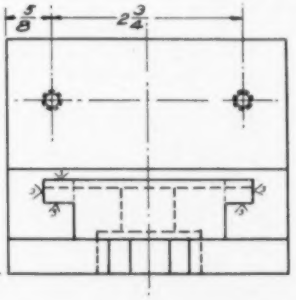
ITEM	REQD	PART NO.	NAME	MATERIAL	DESCRIPTION
1	1	60071-1	FIXED JAW	C.I.	
2	2	60071-2	JAW PLATE	C.R.S.	1/4 x 2 x 4 CYANIDE



(1) FIXED JAW

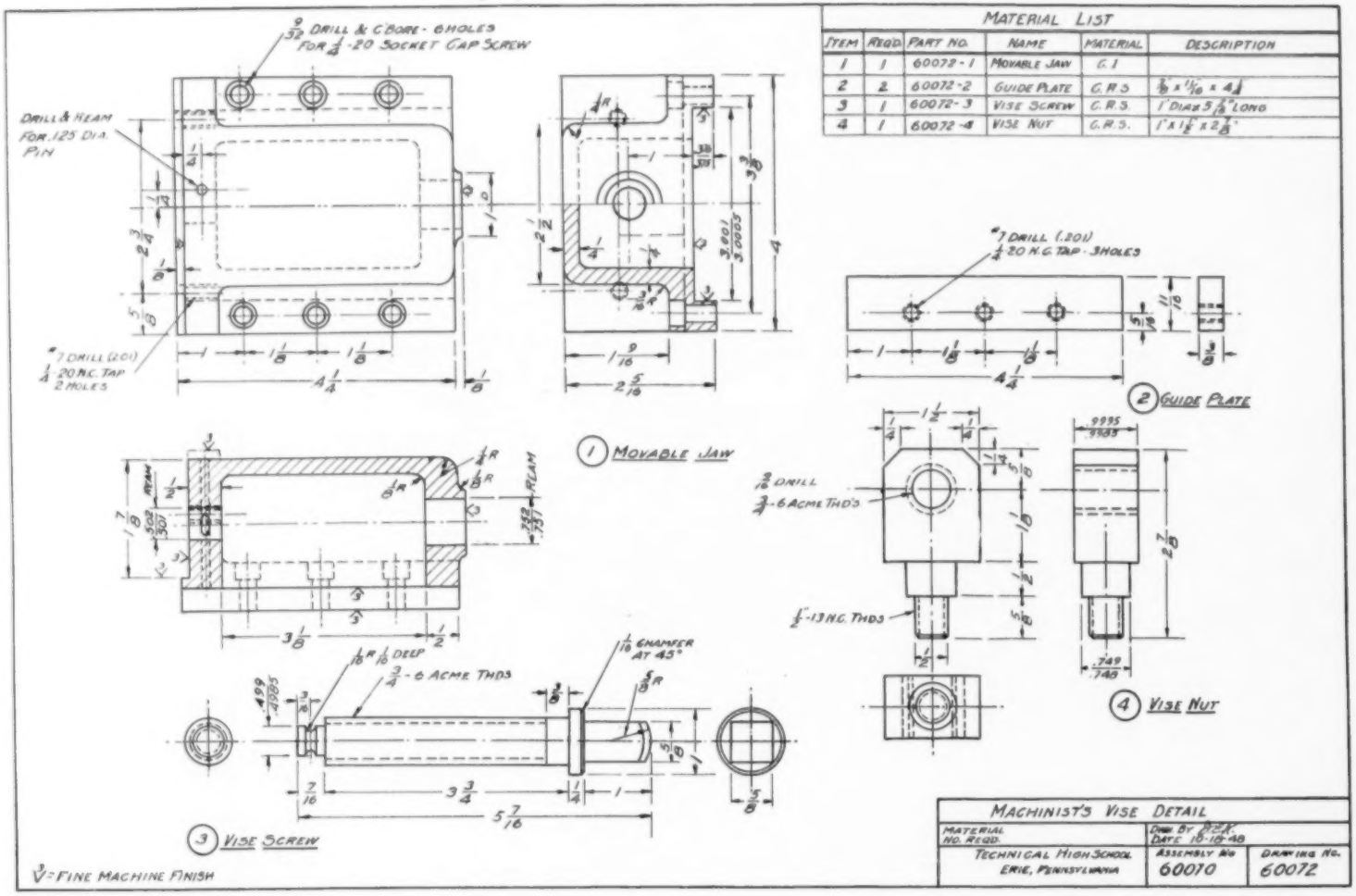


(2) JAW PLATE



▽ = FINE MACHINE FINISH
▽ = EXTRA SMOOTH CASTING

TITLE MACHINIST'S VISE DETAIL			
MATERIAL NO REQD.		DWN BY R.E.S. DATE 10-15-48	
TECHNICAL HIGH SCHOOL ERIE, PENNSYLVANIA		ASSEMBLY NO 60070	DRAWING NO 60071


9/32 DRILL & C'BORE - 6 HOLES FOR 1/4 - 20 SOCKET CAP SCREW
DRILL & REAM FOR .125 DIA. PIN
"J DRILL (.201) 1/4 20 N.C. TAP 2 HOLES
1 MOVABLE JAW
"J DRILL (.201) 1/4 - 20 N.C. TAP - 3 HOLES
2 GUIDE PLATE
3/8 R
1/8 R
REAM
3 1/8
1/2
1/8 R 1/16 DEEP
3/4 - 6 ACME THDS
1/16 CHAMFER AT 45°
3 3/4
5 7/16
3 VISE SCREW
1/2 DRILL
3/4 - 6 ACME THD'S
1/2 - 13 N.C. THDS
.9995 .9985
.749 .748
4 VISE NUT

MATERIAL LIST

ITEM	REQ'D	PART NO.	NAME	MATERIAL	DESCRIPTION
1	1	60072-1	MOVABLE JAW	C.I.	
2	2	60072-2	GUIDE PLATE	C.R.S.	5/16 x 1 1/16 x 4 1/4
3	1	60072-3	VISE SCREW	C.R.S.	1" DIA x 5 1/8" LONG
4	1	60072-4	VISE NUT	C.R.S.	1" x 1 1/2 x 2 3/8"

▽ = FINE MACHINE FINISH

MACHINIST'S VISE DETAIL

MATERIAL NO. REQ'D.	DRWN BY R.E.K. DATE 10-10-48	
TECHNICAL HIGH SCHOOL ERIE, PENNSYLVANIA	ASSEMBLY NO 60070	DRAWING NO. 60072

d) All screw threads shall be right hand including the acme threads.

e) The method of assembly shall be simple.

f) Compactness of design is a very desirable feature.

g) Machining difficulties must be considered and the available machine tool equipment.

h) Special tools, jigs, and holding fixtures to be considered in relation to the design, and the methods of construction that are to be used.

With the foregoing specifications in mind we examined several available existing vise structures from catalogs, samples, and design drawings. Each vise was examined and after discussing the merits and disadvantages of each type, the students made sketches to illustrate the improvements that might be incorporated in a new design. The drawings with this article were traced from the resultant detail and assembly drawings.

Patterns for the cast parts are then made by members of the patternmaking trade classes and it has become a popular project with the boys in the machine-shop classes.

SOLVENT ILLNESS

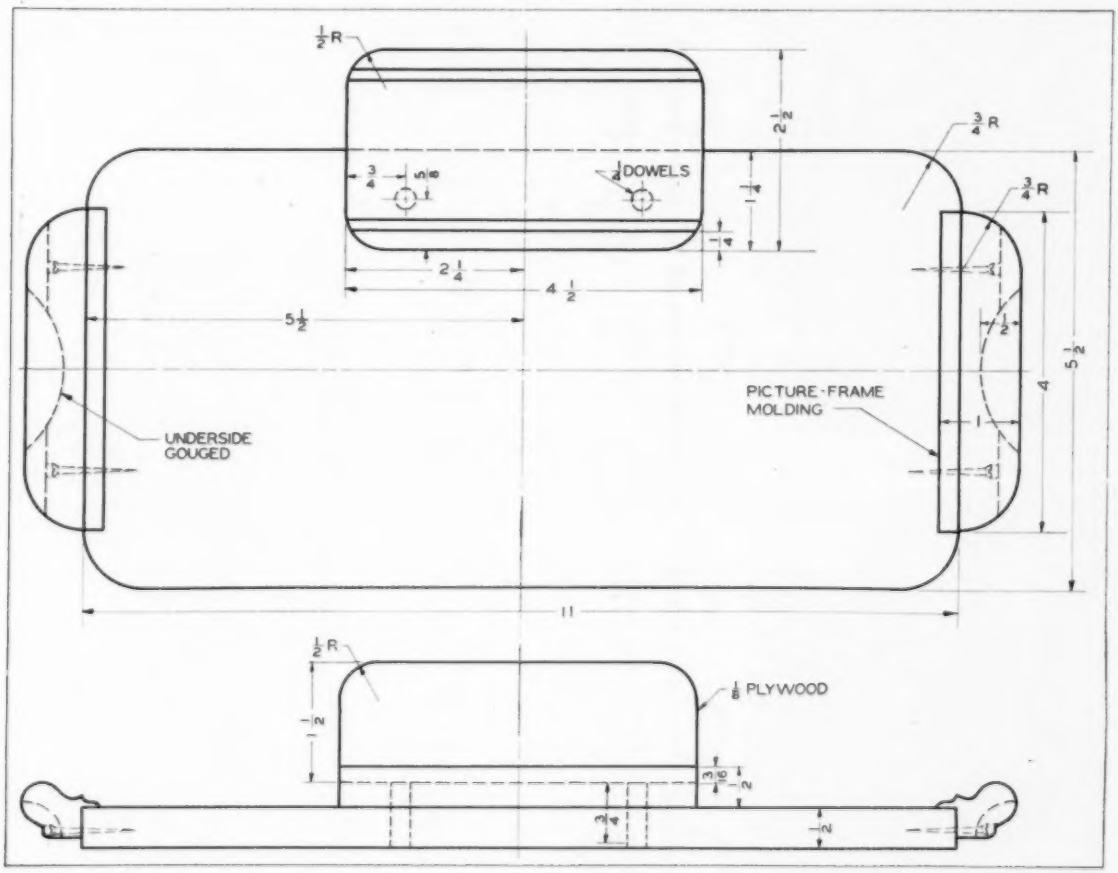
Workers handling volatile solvents should be instructed to report promptly any feeling of discomfort. Dizziness, headache, eye difficulties, weakness, nausea, or stomach upset may be due to other causes, but they can also result from inhaling solvent vapors and may serve as an early warning that medical attention is required. Neglect of such warnings may lead to serious illness. Prompt medical attention, on the other hand, generally leads to complete recovery.

In one instance, a man spent several hours cleaning some equipment with a substantial quantity of solvent in a basement room where there was little ventilation. Several times he felt a little dizzy and went outdoors for a few breaths of air and to get away from the odor. Since this made him feel better he said nothing about his discomfort but kept at the job until it was finished. The next day he felt much worse and by the time he consulted a doctor he was seriously ill and had to be hospitalized.

In another case, a man entered a solvent tank to clean it, and made the serious error of entering the tank without a respirator. He became ill from the heavy solvent fumes and, instead of reporting to a physician, tried to treat himself by taking a few nips of hard liquor. A doctor would have told him that alcohol intensifies the effects of solvents on the body. His self-treatment led to serious illness.

Some persons are especially susceptible to solvent illness, and even a rather mild exposure (degreasing a motor or wiping metal parts with a solvent-saturated cloth, etc.) may lead to illness. For this reason, early signs of discomfort should not be overlooked even when it seems unlikely that much solvent has been inhaled.

While inhalation of solvent vapors is the most frequent source of solvent illness, it sometimes happens that the liquid is swallowed by mistake. The person should be made to vomit and a physician should be called at once. Also, since skin contact with solvents sometimes leads to dermatitis, persons who develop



Cheese and cracker tray. Submitted by Harry S. Baldwin, General Mercer School, Toronto, Ont., Can.

skin difficulties after working with these liquids should report to a physician to prevent aggravation of their condition. — *Safety Research Institute, Inc.*

BASIC STYLES IN POPULAR TYPE FACES

R. RANDOLPH KARCH
Director of Education
Graphic Arts Technical School
Minneapolis, Minn.

The average reader of printed material usually thinks little about the type he reads — where it originated or its particular style. He might be amazed to know that at the present time over 1350 different type faces, not including the many sizes, are in general use today in all kinds of printing.

Why so many different type faces? Just as styles in clothing and automobiles change, so change the styles in type faces. Advertisers and book designers are continually looking for new effects in their printed matter.

The First Types

The first movable types were cast by Johann Gutenberg in Germany in 1450. The face was patterned after that of the scribes who hand-lettered the books of that day. Later, about 1470, Nicholas Jenson designed the first "roman" letters from which he printed the first Italian books.

Claude Garamond then gave the French style to letters; Jean Jannon designed the French Old Style character about 1530, patterned after Garamond's designs.

The Dutch and the English developed their own style, and William Caslon's designs were put to use about the year 1722.

By that time, type face development was well under way, and John Baskerville, also of England, redesigned Caslon's designs, making improvements that are largely copied in today's type faces.

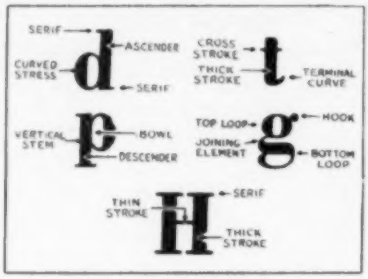
The Italian influence on type face design was made by Giambatista Bodoni in Parma, Italy, in the year 1789.

More recently the modern designers have added the new sans serif and square serif type faces, and the many scripts which embellish the printing of advertising production today.

Many type face designs are patterned in part or in whole on these basic letter designs.

Thus we have the Venetian style introduced by Jenson, the French Old Style by Jean Jannon, the Dutch-English Oldstyle by Caslon, the Transitional style by Baskerville, the Modern style by Bodoni, the Sans Serif and the Square Serif designs introduced by Paul Renner and Heinrich Jost, and the various Script styles by later day designers.

This is the Blackletter style in type face design, patterned after Gutenberg's original letter, which was copied from the work of the scribes who hand-lettered books before the advent of movable type. It is now often referred to as "Old English." Over a dozen such designs exist.



Parts of a type face

Parts of a Type Face

At the left are shown the various parts of a type face. This nomenclature can be successfully used to discuss the various styles of type faces illustrated.

Venetian Style
Nicholas Jenson
Year 1470
Italy

French Oldstyle
Jean Jannon
Year 1530
France

Dutch-English Oldstyle
William Caslon
Year 1722
England

Transitional Style
John Baskerville
Year 1752
England

Modern Style
Giambatista Bodoni
Year 1789
Italy

Sans Serif Style
Paul Renner
Year 1927
Germany

Square Serif Style
Heinrich Jost
Year 1931
Germany

Script Style
Originated in 1800's

What to Look For

When distinguishing between type faces, look for easily seen characteristics, such as:

1. The shape of the serif.
2. The weight of the type face: that is, the ink it puts on the paper.
3. The width of the characters.
4. The contrast between the heavy and light strokes.
5. The peculiar design of the small letter g (the position of the hook, shape of the hook, designs of the upper and lower loops and the design of the joining element).
6. The position of cross strokes.
7. The length of the ascenders and descenders in relation to the size of the small letter e.

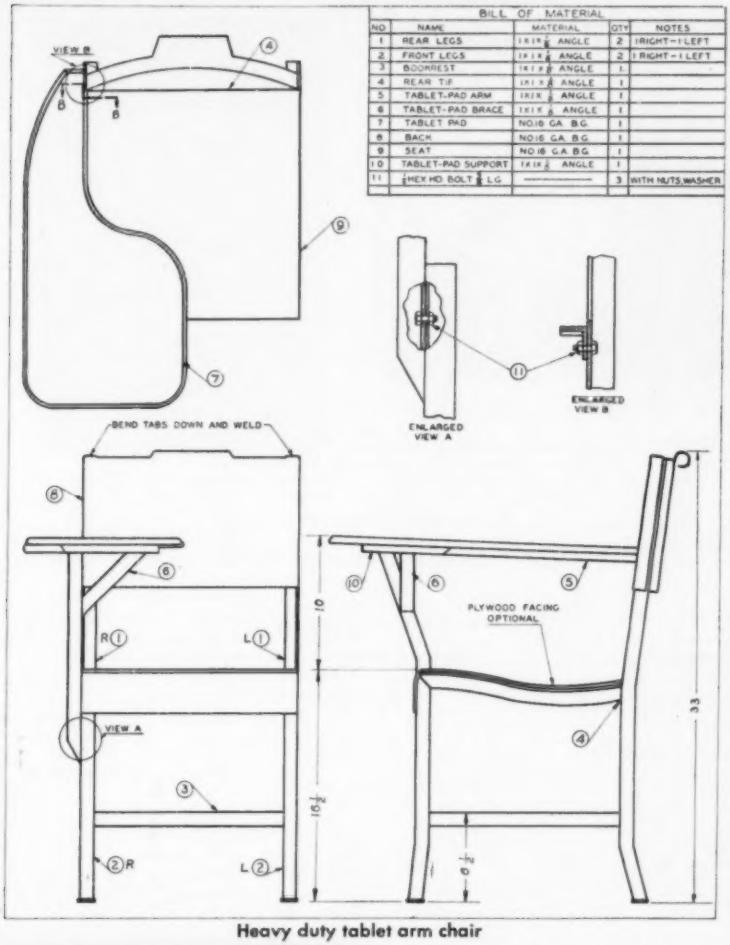
You will find it interesting to try to see to what general "family" of type a given design belongs.

A HEAVY DUTY TABLET ARM CHAIR

GEORGE H. PARKES
Director, The Williamsport Technical Institute
Williamsport, Pa.

At the close of the war, the Williamsport Technical Institute, a public school vocational-

Technical illustration of student chair


BILL OF MATERIAL
NO. NAME MATERIAL QTY. NOTES
1 REAR LEGS 1"x1"x1/8" ANGLE 2 1 RIGHT-1 LEFT
2 FRONT LEGS 1"x1"x1/8" ANGLE 2 1 RIGHT-1 LEFT
3 BOOKREST 1"x1"x1/8" ANGLE 1
4 REAR TIE 1"x1"x1/8" ANGLE 1
5 TABLET-PAD ARM 1"x1"x1/8" ANGLE 1
6 TABLET-PAD BRACE 1"x1"x1/8" ANGLE 1
7 TABLET PAD NO.16 GA. B.G. 1
8 BACK NO.16 GA. B.G. 1
9 SEAT NO.16 GA. B.G. 1
10 TABLET-PAD SUPPORT 1"x1"x1/8" ANGLE 1
11 1/4" HEX HD. BOLT 1 1/2" LG. 3 WITH NUTS, WASHER
VIEW B
BEND TABS DOWN AND WELD
ENLARGED VIEW A
ENLARGED VIEW B
PLYWOOD FACING OPTIONAL
VIEW A
R(1)
L(1)
2R
L(2)
10
16 1/2
33
6 1/2

Heavy duty tablet arm chair

Bending angle iron parts

technical school, found its classroom tablet arm chairs deteriorating from heavy use and damp building conditions. Since replacements were then unobtainable, it was decided to design and construct a quantity of chairs in our own shops.

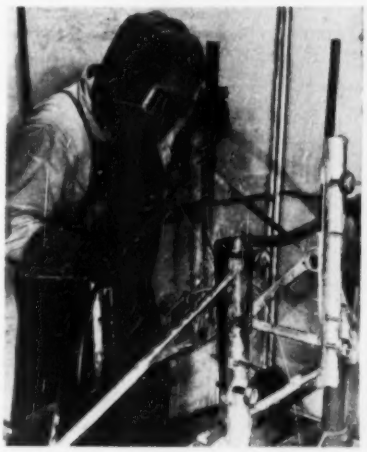
Rugged Construction

The drafting department, under the direction of K. E. Carl, was given the design work. The basic specifications called for the chair to be boyproof. The drafting department was also to consider the availability of materials. This problem was solved by using mill ends and shorts from a local rerolling plant and sheet metal from the trimmings of a sheet-metal plant. Some new material was purchased. The basic material was ⅛ by 1 by 1 angle iron, and 16 gauge black iron. The completed chair weighs 32 lb. It is arc-welded throughout. The finish is baked on green enamel. The arm is detachable.

Fixtures

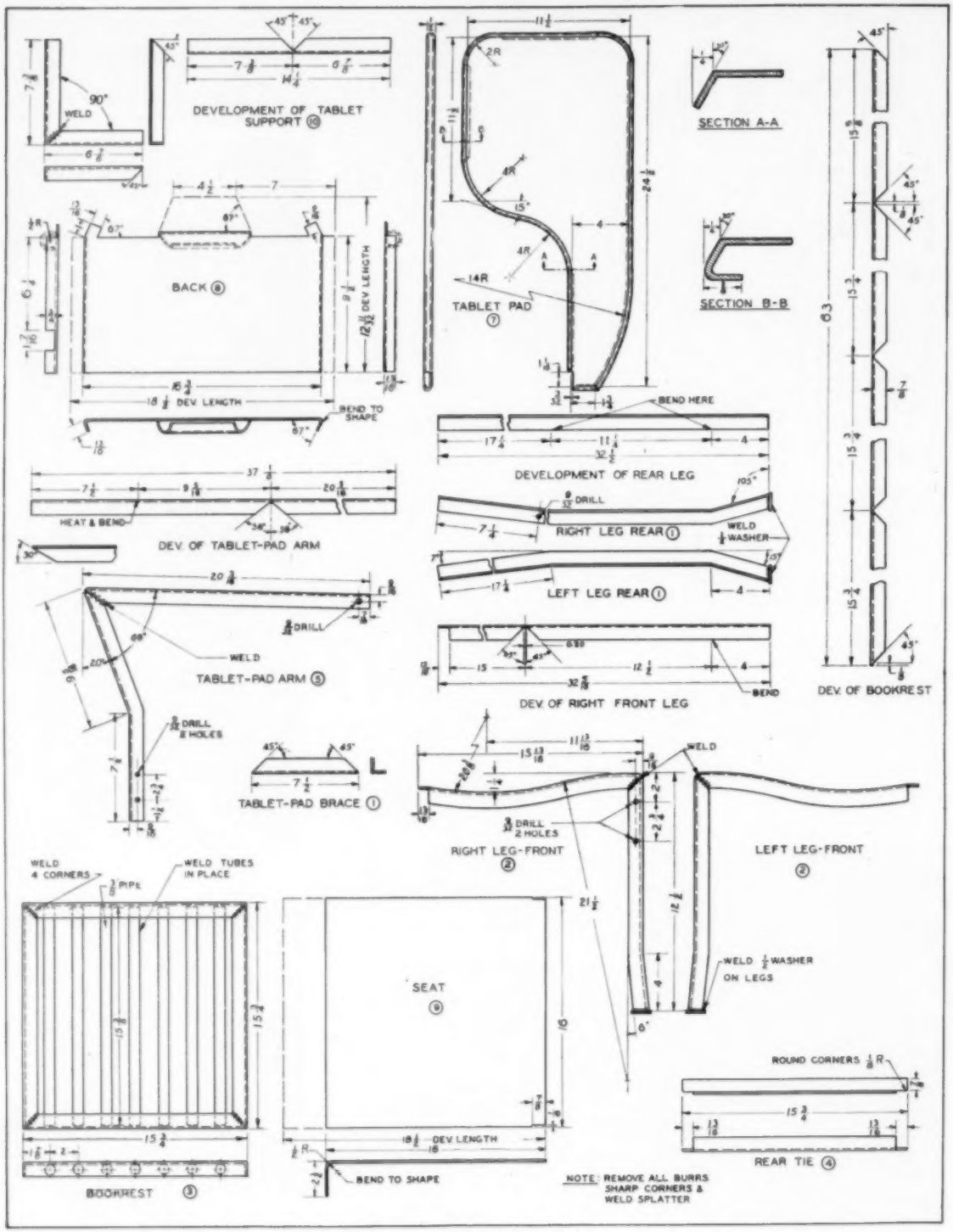
The fixtures for the small production line were designed and constructed by the machine-shop students under L. H. Bardo. The basic machine used for the fabricating was a heavy duty Farquahr hydraulic press. With suitable dies, this press formed the angle iron frame,

Forming the chair arms on the 100-ton press



Welding the chair in a rigid jig

Welds are flush ground



Heavy duty tablet arm chair

Abrasive belt grinding the welded joints

shaped the seat, and blanked and formed the tablet arm. The welding was done in jigs.

The Tablet Arm

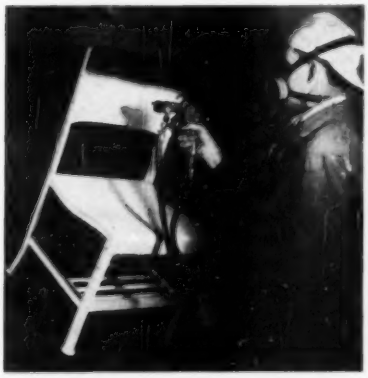
The tablet arm was the only serious die problem. It was necessary to use several dies to curl and flange this heavy gauge metal. Approximately 40 tons of pressure was required for this forming operation. The book rack bars in this version of the chair are scrap aircraft tubing. Any available material, rods, shapes, or even expanded metal could be used at this point.

Finishing the Chair

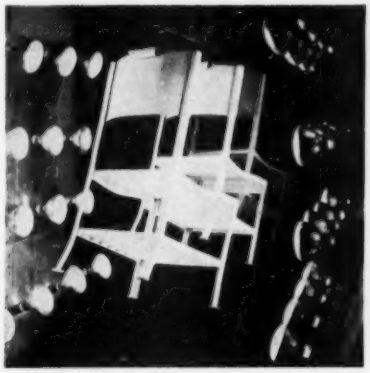
After the welding was completed, and the joints ground smooth, a prime coat was applied by spraying, and dried in an infrared "tunnel." Later, the green finish enamel was similarly applied.

Costs

About 500 chairs were produced over a period of two years. Most of the routine labor of welding, grinding, and finishing was done



Spray coating the chair



Infrared baking of synthetic enamel

by men teachers from other schools, working during the summers and after school hours. Parts were manufactured by the vocational students for training. A careful record was made of the costs, with the outcome that the chairs, which seem almost indestructible, cost about the same as wood chairs.

Design Suggestions

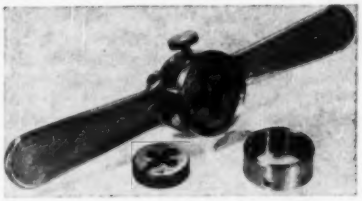
If other schools should become interested in this project, we suggest a study be made of a little better looking chair, using, if possible, lighter gauge metal. Our chairs also proved to be too cold for some people, and we are now in process of fabricating 3/16-inch plywood covers for the seats. It is quite possible that a plywood seat arrangement could be designed so as to eliminate the steel seat entirely.

HAND AND MACHINE DIE HOLDER

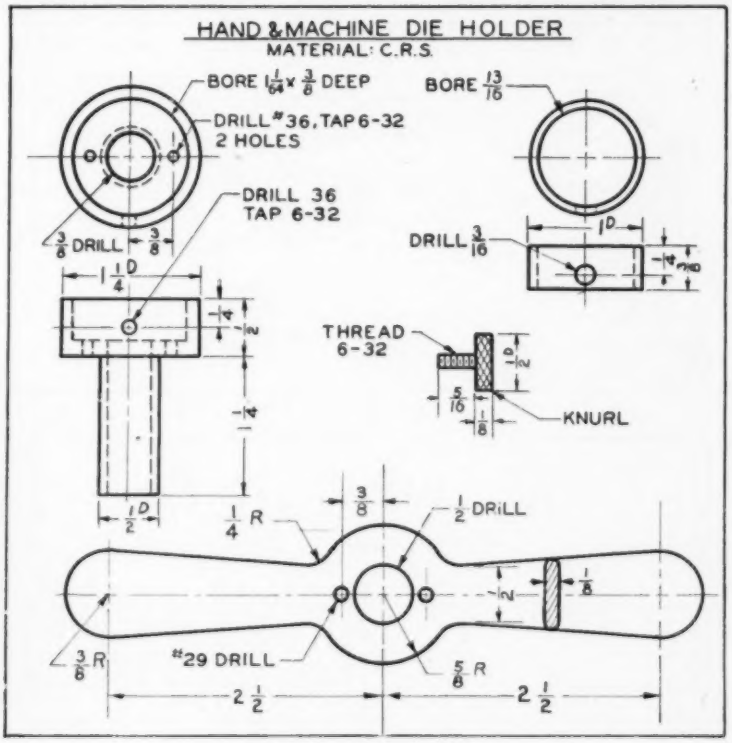
IRA H. JOHNSON
Minneapolis, Minn.

The die holder illustrated and described in this article may be used either as a hand or a machine tool.

Besides being a handy and valuable tool, it presents the machine-shop student with a challenging project which requires little material but involves many fundamental machine-shop operations.



Hand and machine die holder



Hand and machine die holder

TWO DIMENSION PLATE CENTERING

B. ALFRED COX
Booker T. Washington Technical High School
St. Louis, Mo.

Many beginning drafting pupils find difficulty placing views of drawings in the center of plates. Using the traditional three dimensions (thickness, width, and length) causes much confusion to the beginning pupil. The relationships and dimensions of one view to another, using the three-dimension method definitely creates problems to the beginner when centering views. To overcome this problem and increase accuracy, speed, interest, and appearance I have introduced the over-all two dimensions method and find it quite satisfactory.

The three dimensions (thickness, width, and length) have been converted into two dimensions — over-all height and over-all length. Almost every beginning drafting pupil possesses a fairly good conception of the words *height* and *length*. However, he is informed that anything in a vertical plane or a straight bottom to top direction is considered height. Anything in a horizontal plane or a left to right direction is considered length. A beginning pupil who has a fairly clear knowledge of these two directions will have very little difficulty understanding this method.

The pupil is requested to learn three rules — the key of this method.

1. Length of the front view, equals the length of the top view.
2. Height of the front view, equals the height of the end view.
3. Height of the top view, equals the length of the end view.

To conserve space and save time the abbreviations of these rules are used.

1. L.F.V. = L.T.V.
2. H.F.V. = H.E.V.
3. H.T.V. = L.E.V.

D.B.V. are the abbreviations of distance between views.

Four distinct words are kept before the pupil at all times.

A. Distance down B. Distance in

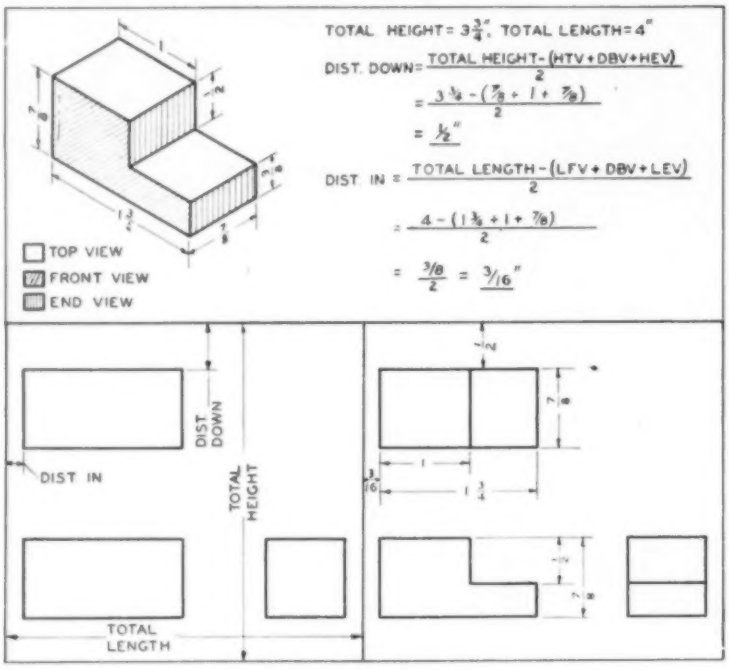
When finding the *distance down* or *distance in* 9 abbreviations are used in each case.

Distance Down	*Distance In*
H.T.V. or L.E.V.	L. F. V. or L.T.V.
D.B.V.	D.B.V.
H.F.V. or H.E.V.	L. E. V. or H.T.V.

To start the thinking, and to create interest, the equivalent side of an opposite view is given, in place of the usual order of abbreviations, when determining *distance down* and *distance in*. The following 8 combinations may be used when finding distance down and distance in.

Distance Down

1.	2.	3.	4.
H.T.V.	H.T.V.	L.E.V.	L.E.V.
D.B.V.	D.B.V.	D.B.V.	D.B.V.
H.F.V.	H.E.V.	H.F.V.	H.E.V.


TOTAL HEIGHT = 3 3/4", TOTAL LENGTH = 4"
DIST. DOWN = (TOTAL HEIGHT - (HTV + DBV + HEV)) / 2
= (3 3/4 - (7/8 + 1 + 7/8)) / 2
= 1/2"
DIST. IN = (TOTAL LENGTH - (LFV + DBV + LEV)) / 2
= (4 - (1 3/8 + 1 + 7/8)) / 2
= 3/8 / 2 = 3/16"
TOP VIEW
FRONT VIEW
END VIEW
DIST DOWN
DIST IN
TOTAL HEIGHT
TOTAL LENGTH

Two dimension plate centering

Distance In

1.	2.	3.	4.
L.F.V.	L.T.V.	L.T.V.	L.F.V.
D.B.V.	D.B.V.	D.B.V.	D.B.V.
L.E.V.	L.E.V.	H.T.V.	H.T.V.

Distance down is the equal space between the top horizontal border line and the top horizontal line of the top view and the bottom horizontal line of the front view and the bottom horizontal border line.

Distance in is the equal space between the left vertical border line and the first vertical line of either the top or front view and the extreme vertical line of the end view and the right hand vertical border line.

I find that using colors on views also prove to aid in shortening the time to understand this method.

To determine the actual dimension of the distance down and distance in, the following mathematical method is performed.

Take the sum total of over-all heights and distance between these heights or over-all length and distance between these lengths (all depending upon whether distance down or distance in is the measurement desired); subtract this sum from either the total height or total length allowed for the views; divide the result by 2. This will give either the amount of distance down or in, depending upon which distance is desired, before starting to place views on a plate. See the illustration which accompanies this article.

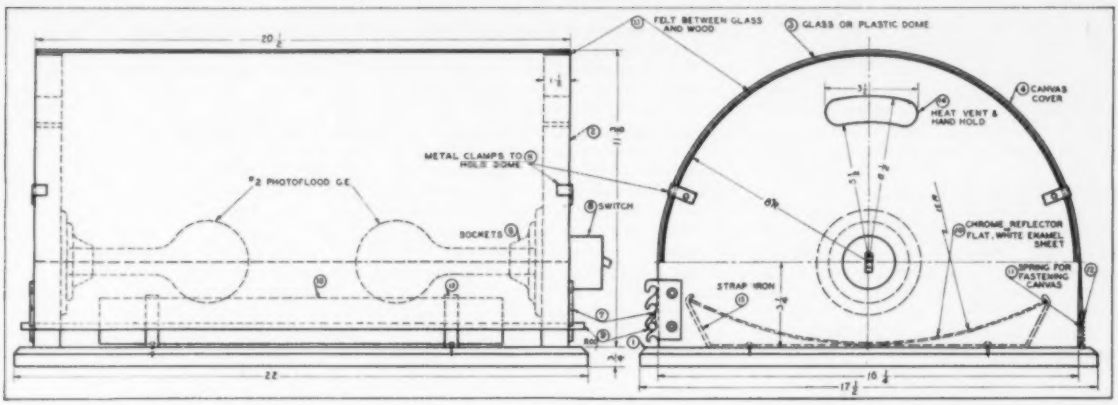
BLUEPRINT MACHINE

H. R. L. CHELLMAN
Fifth Avenue High School
Pittsburgh, Pa.

The machine described herein consists of a wood or metal base on which two wood, or metal semicircular end pieces are fastened. Base and ends may also be made of one piece of sheet metal. A semicylindrical glass dome is fastened in place on the end pieces by four metal clips. A steel back rod, item No. 12, is attached to the base by means of two tension springs. Over this is looped a canvas curtain which is kept taut over the glass dome and held in place by means of the lock rod, item No. 9, when locked in the adjustable rod lock, No. 7. Two porcelain light sockets are attached to the center of the semicircular end pieces, thus equalizing all light rays to the blueprint paper on the rome. A switch controls both photoflood lights. A chrome or white enamel reflector is installed to intensify and equalize the light rays. The reflector is held in place by two strap iron brackets fastened to the base. The hand holes, at the top of the end pieces also serve as heat vents.

To Operate

1. Place tracing face down on glass dome.
2. Place rapid electric blueprint paper over tracing.
3. Pull canvas curtain over dome with tracing and blueprint paper in place and fasten lock rod in the adjustable rod lock.
4. A felt pad may be used under the canvas. Switch on lights (length of printing time



Blueprint machine

depends upon speed of blueprint paper being used). One test piece will quickly establish proper printing time. Regular blueprinting paper will take approximately 4 minutes, while the rapid paper will cut the time to about 3 minutes. Turn light off immediately after printing each print. A No. 2 G.E. bulb will burn about 6 hours. With a 3-minute exposure then, 120 prints can be made at a cost of ½ cent per print for light. Bulbs cost 30 cents each.

5. Remove blueprint paper and immerse in water to which has been added enough potassium bicchromate solution to color the water a lemon or orange color. The solution is non-injurious to hands.

6. Hang up to dry or place on blackboard or other smooth surface.

ECONOMY PLUG-IN DEVICES

ELMER C. O'DONNELL
Yonkers, N. Y.

One of the problems faced by the teacher of electrical subjects is keeping signal devices, such as constant ringing attachments, relays, annunciators, and telephone equipment, in good operating condition. Another is having a sufficient quantity of each piece of equipment on hand to supply the daily needs of the students so they may do their assigned jobs unhampered and without delay.

Every shop teacher knows how closely related these two problems are. The first is caused by thoughtless, careless, or inexperienced pupils who *dig* into delicate equipment with their pliers or screw drivers if the instrument doesn't operate correctly on the first try. The fault, in most cases, is not in the instrument itself, but in incorrect wiring by the pupils, or in poor connections. This is especially true in the lower term shops.

The second problem, insufficient quantity of the same piece of equipment to supply every student who needs that particular thing at the same time, is due partly to the breakdown caused by mishandling and the necessity of limiting purchases because of budgetary allowances, or, in more recent years, the inability to obtain the material from the manufacturers.

The *plug-in* idea was evolved to provide means of overcoming these handicaps. It has been put to use and proved to be a practical solution of the problem.

The dummy block is used by the student in lieu of the actual device. The real device is plugged in by the instructor to test and check the job and permit the student to operate it fully.

Method of Procedure

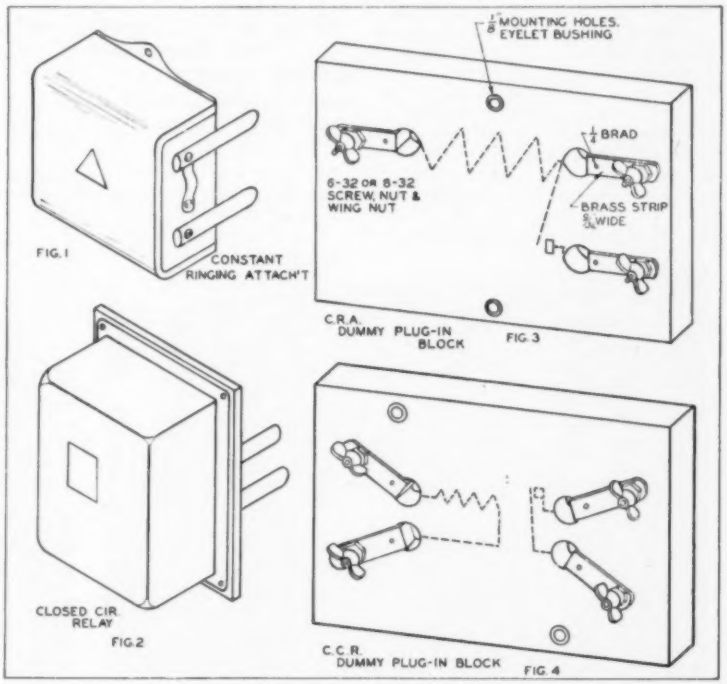
1. Equip the constant ringing attachment relay or other device with *pins* for plugging in.

2. Build as many dummy blocks as you need to accommodate the students.

Figures 1 and 2 show how two different signal devices were fitted for *plug-ins*. Figures 3 and 4 are the dummy blocks.

For Constant Ringing Attachments

Cut and file or turn three ¼-in. brass rods 1½ in. long. Drill and tap for 6–32 screws,



Economy plug-in devices

¼ in. from untapered end. Remove the binding post nuts and replace them with the brass rods. See Figure 1.

To make the dummy plug-in block shown in Figure 3, cut wood block of ⅞-in. stock, preferably of hardwood, to appropriate size. Mark for hole centers to register with plug-in pins on constant ringing attachment, and drill 5/16-in. holes. Elongate the holes slightly, laterally, with a rattail file.

Cut the brass strips as shown and bend down into the holes about ¾ in. Fit with screws, nuts, and wing nuts for binding posts.

Draw schematic of internal wiring (shown here in dotted line) on face of block.

On the closed circuit relay shown in Figure 2, remove the 4–36 terminal screws, and enlarge the holes to accommodate 6–32 screws. Cut four brass rods, ¼ in. diameter, ¾ in. long. Camber them slightly on one end, then drill and tap the other end for 6–32 machine screws to a depth of ⅜ in. Now put these plug-pins on by using ½-in. 6–32 screws through the relay terminals.

The dummy plug-in block for the closed circuit relay is made in the same general manner as was used in constructing the block for the constant ringing attachment shown in Figure 3.

Where the pin plugs are quite close together, as they are on this relay, the distance between wing-nut terminals must be broadened so turning a wing nut will not interfere with the adjacent nut.

Advantages of This Method

1. One or two of each device is sufficient to take care of any number of students instead of requiring ten, twenty, or more articles of the same kind.

2. The device is with the instructor at all times so that there is no opportunity for its careless use. Therefore, the equipment stays in dependable operating condition.

3. The dummy blocks are cheap, easily made as a student project, and, since they have a schematic diagram of the internal wiring on the block face, they serve as an additional teaching aid in helping the student to compare the diagram with the actual apparatus and its connections in the circuit.

4. Much less storage space is required for the dummy blocks than for a like number of real devices, and the blocks better withstand the rugged handling given by students.

A few vocational educators and some industrialists contend that actual devices, just as they are received from the manufacturers, should be used by the pupils. This idea is ideal, the writer agrees, but anyone who has had practical school-shop experience knows that this is a Utopian wish, and is quite impractical. Electrical devices are made and intended for one installation. They are certainly not rugged enough, even under the best conditions, to withstand being installed and removed on the average of twice a day for a minimum of 180 school days per year by the students. Many shop teachers resort to mounting the devices on a back board of wood, and wiring them to additional terminals on the block in an effort to lengthen the life of such equipment. This scheme is successful to a degree, but it does not remove the opportunity for the student to tamper with them.

The *plug-in* idea, modified to fit, may be extended to annunciators, telephone, and other equipment.

The instructor may go a step further and make a small tote box to carry 1 constant ringing attachment, 1 relay, 2 annunciators, and other devices so that he may tour his shop and check different student jobs without unnecessary steps.

STOCK RACK FOR METAL AND MACHINE SHOPS

NORMAN PETERSON
LaSalle-Peru Township High School
and Junior College
LaSalle, Ill.

The stock rack described and illustrated herein was built by the students in the general metal classes and designed by the instructor. This one has been used with success in the machine shop for two years and a like one 10 ft. long has been built for the general metal shop.

The stock rack pictured in the illustrations is 8 ft. long, 33 in. wide at the base, and has a total height from the floor of 44 in. The triangular uprights have a 24-in. spread at the bottom and 5½ in. at the top with an altitude of 36¾ in. The tray on top is 7 in. wide by 8 ft. long with an 18-gauge sheet iron loose bottom to facilitate cleaning. Welded throughout, the rack is made of 1½ and ¾-in. angle iron. It is mounted on sturdy 4-in. swivel casters.

This stock rack is positively tip proof and can be moved with reasonable ease to new locations and shifted for sweeping or cleaning the shop.

It has several advantages over other stock racks which are mounted on the wall or under a bench. It can be moved to new locations if it becomes necessary to rearrange the shop layout. It is possible to walk around it which makes it easy to load and remove the steel and also to keep it in orderly arrangement.

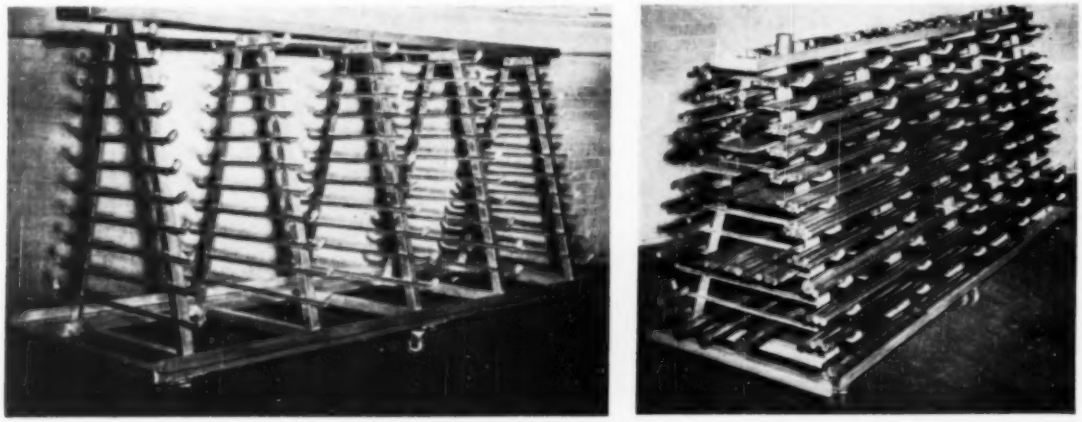
The tray on top for short pieces has several very distinct advantages. It saves steel by making it possible to keep small pieces in good order and in an accessible place. Since the small pieces are the most accessible the student usually selects from the tray first before attempting to cut a 1-in. piece from an 8-ft. length of fresh stock. This keeps short pieces to a minimum, and saves time since in many cases it eliminates cutting. It also eliminates the scrap box for odds and ends, found in some corner of so many shops.

The cost and effort in building this stock rack justifies itself in that it makes a practical welding project and soon pays for itself in better housekeeping and saving of steel.

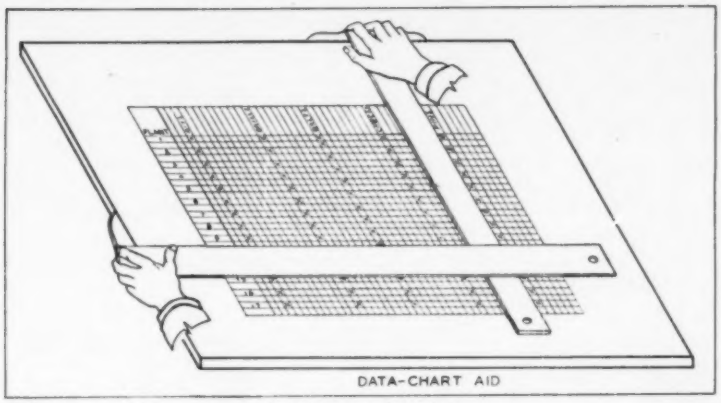
AN AID FOR READING DATA

R. E. MURRAY
Trades Co-ordinator
Public Schools
Fremont, Ohio

For reading minute data quickly without



Stock rack for metal and machine shops



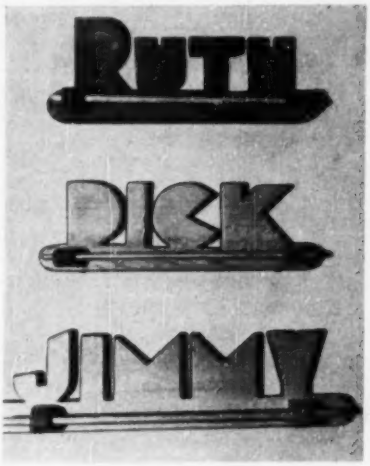
An aid for reading data

undue eyestrain, the writer conceived the idea to use two ordinary T squares, one placed on the left hand side of a drawing board on which a data chart has been mounted, and the other on the top edge. By sliding the T squares toward each other, data may be directly read in the vertex of the right angle formed by the intersection of the two blades, and thus many errors may be avoided.

PERSONALIZED TIE OR BELT RACKS

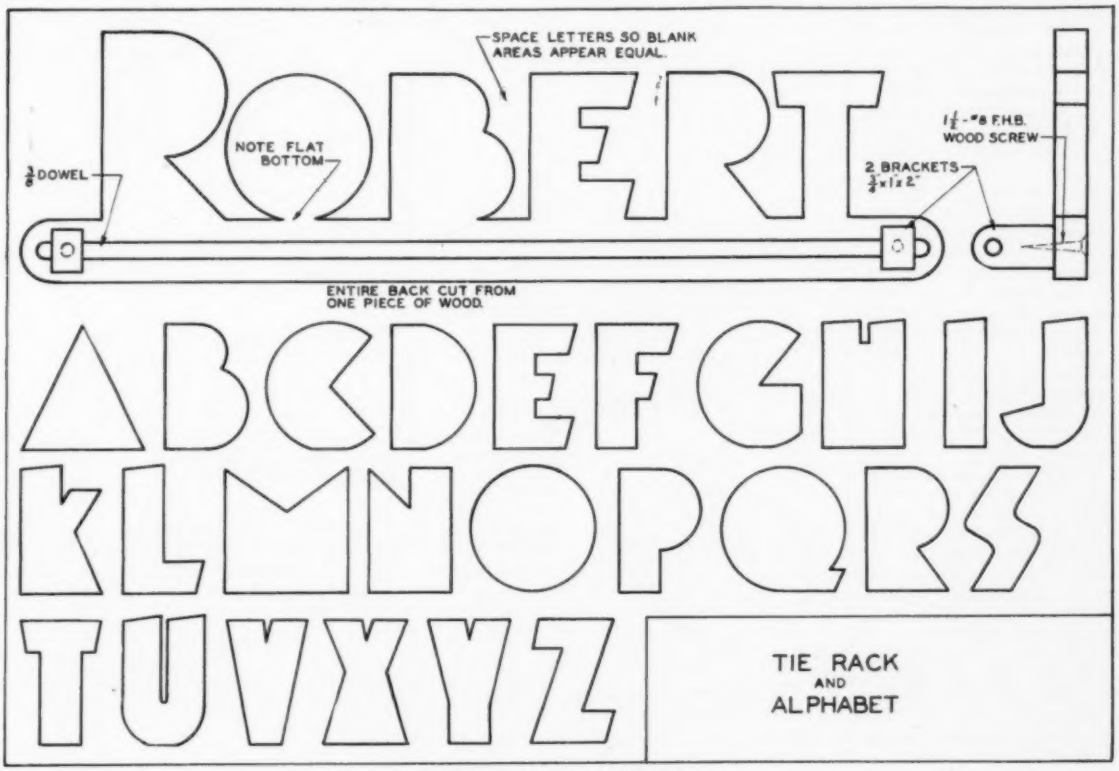
DELMAR W. OLSON
Assoc. Prof. of Ind. Arts
Kent State University
Kent, Ohio

This novelty rack holds ties for a boy or belts for a girl. Jig-sawed from a single piece of wood, either solid or ply panel, the project involves the simplest of construction.



Personalized tie or belt racks

The pattern must be laid out full size, preferably on co-ordinate or quadrille paper. Two points should be kept in mind. Arrange


SPACE LETTERS SO BLANK AREAS APPEAR EQUAL.
NOTE FLAT BOTTOM
3/8 DOWEL
1 1/2 - #8 F.H.B. WOOD SCREW
2 BRACKETS 3/4 x 1 x 2"
ENTIRE BACK CUT FROM ONE PIECE OF WOOD.
ROBERT
A B C D E F G H I J
K L M N O P Q R S
T U V X Y Z
TIE RACK AND ALPHABET

Personalized tie or belt rack

the letters so that the blank spaces between them appear to be the same. Mechanical spacing of letters with a ruler usually means poor spacing.

Remember to draw the letters, C, G, J, O, and U with flat bottoms so that they will not be sawed off the base.

A natural finish of a wash coat of shellac, rubbed with fine steel wool, followed by two coats of paste polishing wax was used on the racks shown.

SOME FACTORS IN THE TEACHING OF SHOP MATHEMATICS

W. H. EDWARDS
Redford High School
Detroit, Mich.

The factors affecting the teaching of high school shop mathematics are of primary importance to the vocational department in a school. The factors are important as a basis for the vocational department's evaluation of the teaching if the shop mathematics classes are under the jurisdiction of the mathematics department. The factors are of even more importance if shop mathematics is taught by vocational personnel because the latter are usually not specialists in the teaching of mathematics.

This article will discuss five of the shop mathematics teaching factors.

I. *Objectives of Shop Mathematics Courses.* There are two general objectives of high school shop mathematics. These objectives are:

1. To provide a phase of shop vocational experience as a basis for guidance counsel and possible decision.

2. To bring the vocational course student to a level of achievement so that his mathematics functions in shop situations.

Obviously there are two achievement levels. The nonvocational or the "doubtful" vocational student will have one basis for promotion, credit, mark, or other evidence of class success. All of the vocational students must meet another achievement level, namely mastery.

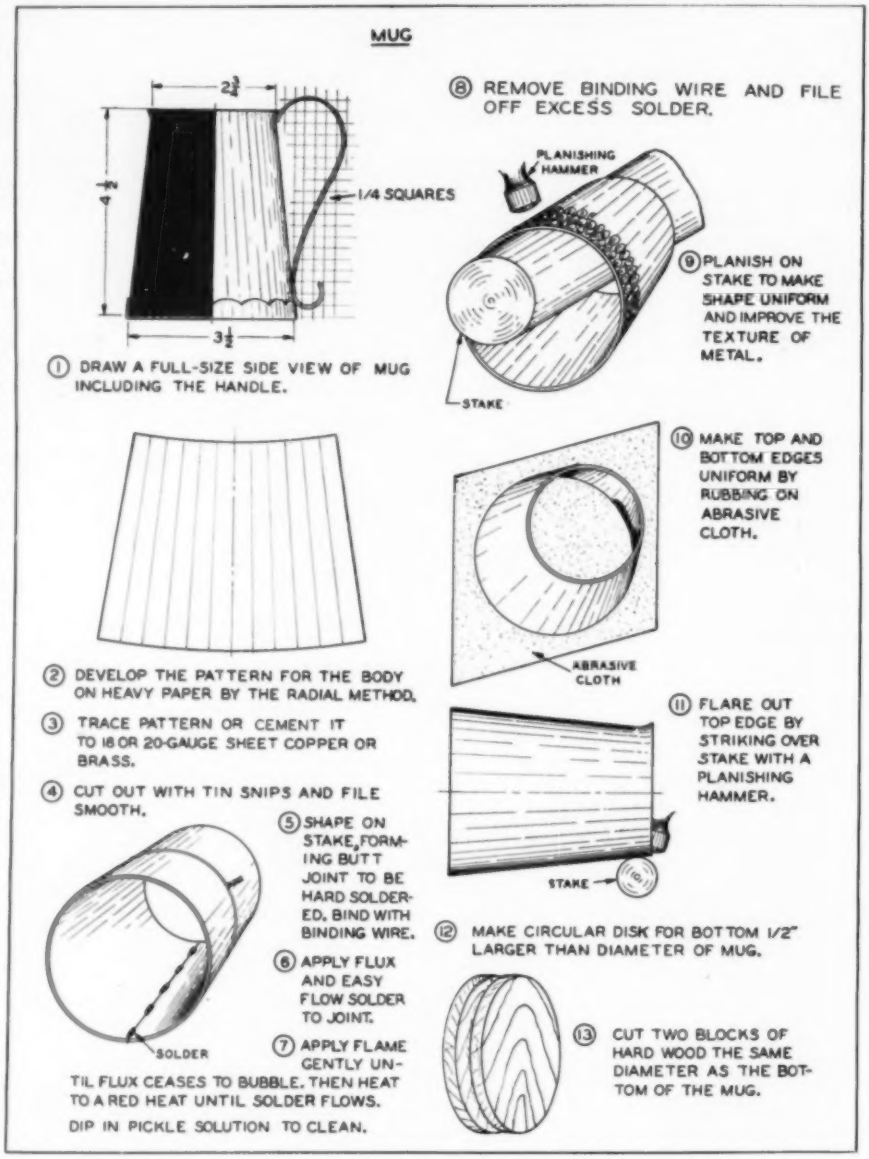
II. *Elements in Mastery.* There are three elements involved in mastery of shop mathematics. The order in which these elements function in a shop situation are:

1. Selection of the appropriate formula. The appropriate formula in the shop is the formula in which the required factor is the dependent variable. Suppose the small end diameter, D_s, is required for a taper whose large end diameter, D_l, length of taper, l_t, and taper per foot, tpf, are specified. The appropriate formula is not the basic taper formula $\text{tpf} = \frac{(D_l - D_s)12}{l_t}$ but is the form

$$D_s = D_l - \frac{(\text{tpf})l_t}{12}$$

2. Substitution in and the order of operations to evaluate the appropriate formula.

3. Computing the evaluation result to usable decimal accuracy. Usable accuracy in the case of $c = \sqrt{a^2 + b^2}$ would require rounding off the square root to the decimal accuracy specified by dimensions a and b or by the tolerance. If the revolutions per minute are being computed by the formula $\text{r.p.m.} = \frac{4(CS)}{D}$,


MUG
2¾
4"
1/4 SQUARES
3½
① DRAW A FULL-SIZE SIDE VIEW OF MUG INCLUDING THE HANDLE.
② DEVELOP THE PATTERN FOR THE BODY ON HEAVY PAPER BY THE RADIAL METHOD.
③ TRACE PATTERN OR CEMENT IT TO 18 OR 20-GAUGE SHEET COPPER OR BRASS.
④ CUT OUT WITH TIN SNIPS AND FILE SMOOTH.
⑤ SHAPE ON STAKE, FORMING BUTT JOINT TO BE HARD SOLDERED. BIND WITH BINDING WIRE.
⑥ APPLY FLUX AND EASY FLOW SOLDER TO JOINT.
⑦ APPLY FLAME GENTLY UNTIL FLUX CEASES TO BUBBLE. THEN HEAT TO A RED HEAT UNTIL SOLDER FLOWS.
DIP IN PICKLE SOLUTION TO CLEAN.
SOLDER
⑧ REMOVE BINDING WIRE AND FILE OFF EXCESS SOLDER.
PLANISHING HAMMER
⑨ PLANISH ON STAKE TO MAKE SHAPE UNIFORM AND IMPROVE THE TEXTURE OF METAL.
STAKE
⑩ MAKE TOP AND BOTTOM EDGES UNIFORM BY RUBBING ON ABRASIVE CLOTH.
ABRASIVE CLOTH
⑪ FLARE OUT TOP EDGE BY STRIKING OVER STAKE WITH A PLANISHING HAMMER.
STAKE
⑫ MAKE CIRCULAR DISK FOR BOTTOM 1/2" LARGER THAN DIAMETER OF MUG.
⑬ CUT TWO BLOCKS OF HARD WOOD THE SAME DIAMETER AS THE BOTTOM OF THE MUG.

Project sheet — mug, submitted by Clifford L. Yard and Henry J. Kauffman, industrial-arts department, State Teachers College, Millersville, Pa.

the usable accuracy would be the nearest r.p.m. since the actual r.p.m. setting obtainable on machines would very probably not correspond with the computed result.

III. *Function of Memory.* The sole purpose of any shop computation is a usable result. Every possible chance for error should be eliminated. Consequently nothing should be trusted to memory. At all times the student should be trained to refer to tables of formulas or data. There are only three elements that should be committed to memory and habit, and these three are:

1. Knowing that the appropriate formula must be selected first of all.
2. Mastery of direct evaluation of formulas.
3. Knowing that results must be to usable decimal accuracy.

IV. *Functions of Models.* There are two functions of models in the teaching of shop mathematics:

1. To motivate the learning by showing the place of a certain formula or computation in a shop operation.
2. To strengthen the possibility of recall by association.

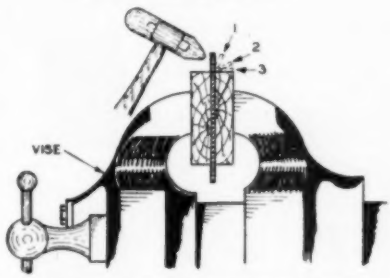
If a sine bar is used in the classroom to demonstrate precision angle setup or measurement, the student's mastery of the sine function and the function tables is significantly stimulated. Furthermore, the chances of a student's thinking to use the sine function and/or the sine bar in connection with a shop operation are considerably enhanced if he has previously had this instrument associated with his learning of the sine function.

It should be pointed out that mastery of shop instruments is not an objective in the teaching of shop mathematics.

V. *Shop Mathematics Is a Course in Itself.* Shop mathematics should be taught as a course in itself and not as a series of teaching units incidental to shop classes. There are several reasons in support of this thesis:

1. The objectives in the teaching of shop mathematics cannot be attained by *part-time* attention to shop mathematics. Mastering the elements involved in the mathematics that functions in shop situations requires the full-time attention of the students.
2. The range of units of mathematical study desirable and required in vocational training exceeds the units taken up in most high school shop courses.
3. Expensive equipment remains idle and valuable training time is lost if a shop class spends part of its time on mathematics.
4. There are certain applications from formal mathematics that might not occur due to lack of time or from oversight in a "part-time" shop mathematics course. As an example, consider the roots of common fractions, the extractions of which occur in shop computations. The evaluation of $\sqrt{\frac{3}{16}}$ is much more efficiently handled by the principle of rationalization of fractions within the radical sign than by extracting the square root of the decimal equivalent of $\frac{3}{16}$. Thus $\sqrt{\frac{3}{16}} = \frac{1}{4}\sqrt{3}$, easily evaluated with the aid of a table of roots.

MUG – CONTINUED



(14) PLACE IN VISE AND BEND THE METAL OVER THE WOOD AS INDICATED.

(15) LAY OUT SCALLOPS AND CUT WITH SNIPS.

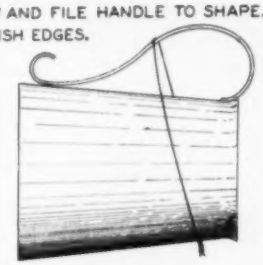
(16) FILE EDGES SMOOTH AND POLISH ON BUFFER.

(17) ANNEAL AND CLEAN THE BOTTOM BY PLACING IT IN THE PICKLE SOLUTION.

(18) TO DEVELOP PATTERN FOR THE HANDLE SET DIVIDERS TO 1/4" AND STEP OFF ITS LENGTH.

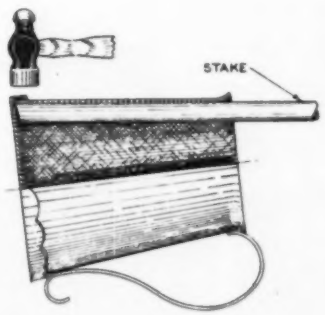
(19) USE #12 OR #14-GAUGE COPPER OR BRASS FOR THE HANDLE. LAY OUT SUGGESTED PATTERN OR SUBSTITUTE ORIGINAL DESIGN.

(20) SAW AND FILE HANDLE TO SHAPE. POLISH EDGES.



(21) BEND TO DESIRED SHAPE TO FIT THE BODY OF THE MUG, FASTEN IN POSITION WITH BINDING WIRE, AND HARD SOLDER IN PLACE.

(22) RIVETS CAN BE SUBSTITUTED FOR HARD SOLDER.



(23) PLACE BOTTOM OVER MUG. TAP TO FIT SIDE OF THE MUG.

(24) SWEAT SOFT SOLDER INTO JOINT.

(25) POLISH MUG WITH TRIPOLI OR OTHER ABRASIVE.

Project sheet — mug, submitted by Clifford L. Yard and Henry J. Kauffman, industrial-arts department, State Teachers College, Millersville, Pa.

The teaching of shop mathematics is a precision job. There are but two objectives and but three elements underlying mastery of the subject matter. The extent of the precision depends upon the teacher's understanding of the function of memory and the use of models in the learning process, and his appreciation that shop mathematics is a psychological learning unit in itself.

MODERN IRON FURNITURE

CARSON F. THOMSON
Bret Harte Junior High School
Los Angeles, Calif.

The dining room chair and occasional stool, shown herewith, are the result of a desire to create an easily fabricated, comfortable, and attractive type of furniture that can be made in a Junior high school general metal shop.

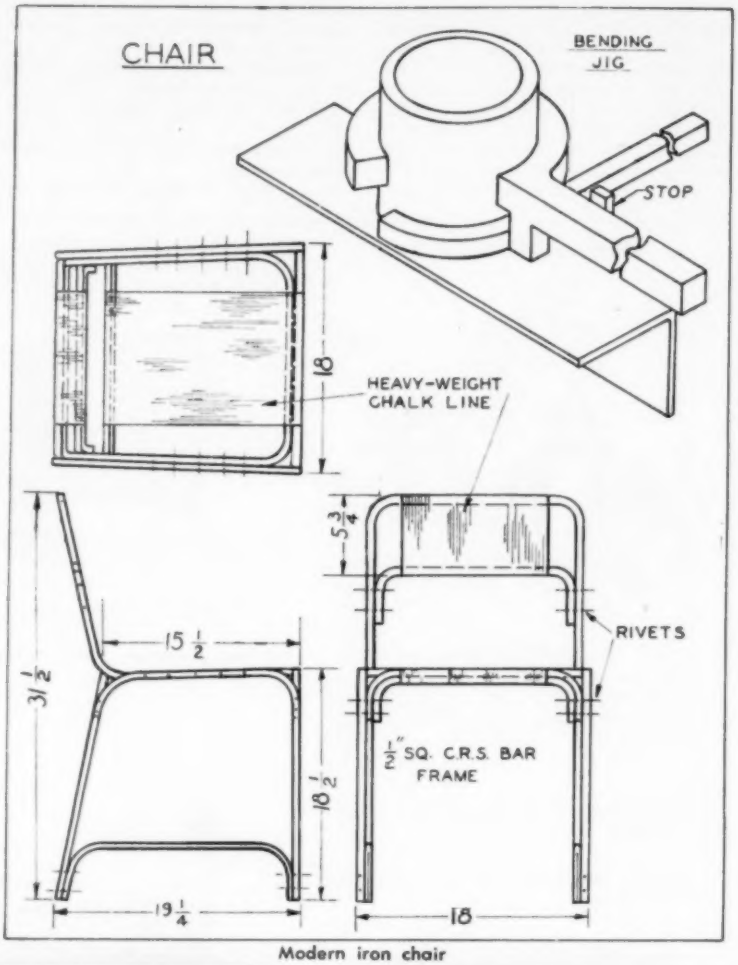
This furniture is made of ½-in. C.R. steel with tightly wrapped heavy chalk line as the seat material. This chalk line, which serves the double purpose of being both the structure and upholstery of the seat, is surprisingly comfortable and very strong.

The jig for bending all the curves of the steel framework was made in a short time by welding a piece of 3½-in. pipe to a short length of angle iron to form the radius about which the heated ½-in. stock is bent with the swinging bar which rotates around the pipe. Sheet metal templates were made for the bends of the legs and base of the chair back. All other bends are 90 deg. The frame is assembled with 3/16-in. iron rivets.

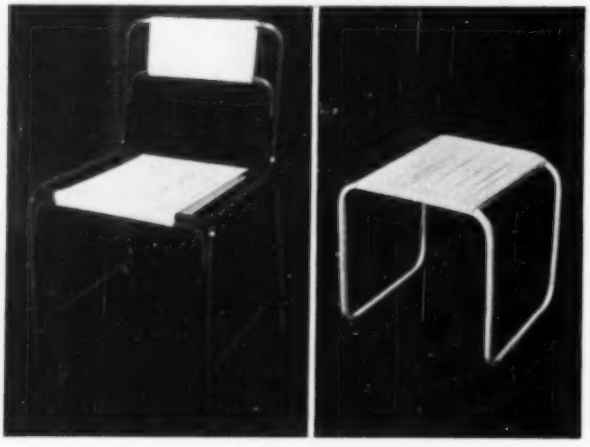
After assembly the chair is given a sprayed lacquer finish.

Small holes are drilled at each end of the space to be wrapped, the cord fixed with a knot on the inside, and the whole seat or back wrapped tightly. One ball of cord is not enough for the seat, but the knot joining the two rolls is easily hidden under the seat bottom.

The two examples pictured here are but two of many pieces of furniture which can be made by this type of construction.



Modern iron chair



Metal chair and stool

Using the bending jig

Careless driving can wreck a fender — or a family!

FREE!

"HOMEWORK" FOR THIS SUMMER

TEACHING AIDS FOR NEXT FALL

Find out more about ALUMINUM SHOP PRACTICES

FORMING ALCOA ALUMINUM—64 pages; 21 illustrations; 11 tables—Explains the fabrication of aluminum and magnesium by blanking and piercing, drawing, spinning, shape forming, embossing, coining and stamping. Discusses the forming characteristics of the various aluminum alloys.

ALCOA ALUMINUM AND ITS ALLOYS—156 pages; 25 illustrations; 88 tables—Fundamental information concerning the many Alcoa Aluminum Alloys. Data in tabular form on their chemical and physical properties as well as the tolerances and sizes of all commercial forms.

RIVETING ALCOA ALUMINUM—56 pages; 19 illustrations; 19 tables—Detailed information on riveting aluminum and its alloys. Covers strength and proportions of riveted joints, driving methods, and selection of rivet alloy. Also, brief account of aircraft riveting.

FINISHES FOR ALCOA ALUMINUM—64 pages; 60 illustrations—A handbook which discusses the many kinds of finishes that can be applied to aluminum by mechanical, organic, chemical, electrochemical, and electroplating methods. 4-color plates show actual finishes.

WELDING AND BRAZING ALCOA ALUMINUM—134 pages; 52 illustrations; 18 tables—Complete information on torch, arc, resistance welding, and brazing of aluminum. Includes a discussion of the recently developed tungsten-arc welding method. Six full-color illustrations of welding flame adjustments.

MACHINING ALCOA ALUMINUM AND ITS ALLOYS—68 pages; 21 illustrations; 6 tables—Useful information on tools best fitted for machining, drilling, reaming, tapping and threading, sawing and filing aluminum; speeds and feeds; and general machining practice.

PICTURES—Eight Full-Color Cards on Aluminum. Designed for classroom walls, these 16 x 20-inch pictures illustrate the history, manufacture, and use of aluminum. Suitable for science classes ranging from the sixth-grade level through senior high school. Subjects covered: Hall's discovery, mining, production, research, aluminum in architecture and transportation, on the farm and in the home.

CHARTS—Chart on Chemistry and History of Aluminum. Gives the chemistry and history of aluminum. Includes photographs, drawings, and descriptive matter covering the mining and manufacture of raw materials. The electrolytic cell in which the metal is made is graphically illustrated. On the reverse side, a diagram traces steps in the production of aluminum. Suitable for science, industrial arts and vocational work in senior high schools. 17⅞ x 27½ inches.

FILMS FROM ALCOA'S LIBRARY—The Alcoa Library contains a great store of how-to-do-it motion pictures that tell in detail how to form, join, machine, finish and work this versatile metal, aluminum. All of these films are aimed at instructing in aluminum-working techniques and have special appeal for young men learning to fabricate and assemble aluminum articles.

For background of the industry, our library has films that tell this fascinating story in a variety of ways. *Unfinished Rainbows* depicts the history of aluminum. *Curiosity Shop* tells a story of aluminum research. Both are in brilliant Technicolor. Write for the *Alcoa Library Catalog*, which lists and describes the many educational films available for classroom use.

These books and teaching aids will prove invaluable to any teacher whose students are working with aluminum . . . free to industrial arts teachers. Write: ALUMINUM COMPANY OF AMERICA, 1773 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN ALUMINUM

ALCOA ALUMINUM

ALL ABOUT MEASURING

PUT THIS BOOKLET TO WORK IN YOUR SHOP CLASSES . . . IT'S FREE

The story of precision measuring written and illustrated by The L. S. Starrett Company, World's Greatest Toolmakers, especially for students in school shop classes. An authoritative review of the means and methods of achieving uniform accuracy used in industry today. A valuable aid to class instruction free to instructors. Send the coupon for a sample copy and form for requesting additional free copies.

The L. S. STARRETT CO., Dept. CE
Athol, Massachusetts, U. S. A.

Please send free copy of your booklet "The Tools And Rules For Precision Measuring." Also form for requesting additional copies.

Name .....
Title .....
School .....
Address .....

Starrett
Standard of Precision
MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS · DIAL INDICATORS
STEEL TAPES · HACKSAWS AND BAND SAWS
PRECISION GROUND FLAT STOCK
Buy Through Your Distributor

education, visual aids, and how to improve the teaching of printing.

A panel consisting of Loren H. Carter, Chicago, Ill.; Frederick J. Amery, Pittsburgh, Pa.; William R. Baker, Menomonie, Wis.; Fred J. Landon, Minneapolis, Minn.; William O. Morgan, Chicago, Ill.; Robert M. Shields, Detroit, Mich.; and John R. Shultz, Milwaukee, Wis., discussed the present and future of graphic arts education after which a color film on the manufacture of printing ink was shown.

The part-time education meeting held on Wednesday afternoon was under the chairmanship of Charles W. Sylvester, treasurer of the American Vocational Association.

The theme for this meeting was "Vocational Education for Out-of-School Youth."

The discussion panel consisted of W. F. Stewart, Columbus, Ohio; John B. Coleman, La Crosse, Wis.; Mary Lyle, Ames, Iowa; C. A. Nolan, Syracuse, N. Y.; George B. Cox, Corvallis, Ore.; and George E. Hutcherson, Albany, N. Y.

The vocational guidance meeting on Wednesday afternoon discussed the tools and techniques to be used in conducting guidance programs.

John A. Kubiak, Madison, Wis., was chairman, and A. H. Edgerton, Madison, Wis., presided.

John R. Wrage, Madison, Wis., presented an address on "Adjusting to the Reality of Community Life," and John P. Treacy, Milwaukee, Wis., spoke on "Counseling Techniques Aid Successful Adjustment."

A panel discussion on the general theme of guidance was then led by A. H. Edgerton.

The members of this panel were Carl G. Bertram, Appleton, Wis.; Josephine Hintgen, La Crosse, Wis.; Harry A. Jager, Washington, D. C.; Harold B. Mennes, Neenah, Wis.; and Edward J. Pfeifer, Madison, Wis.

At the Friday afternoon guidance session the organization and administration of guidance services was discussed.

Glenn Smith, Lansing, Mich., was chairman.

Ella Stephens Barrett, Raleigh, N. C., spoke on "Some Major Responsibilities of State Supervisors in Developing Local Guidance Programs," and George E. Mowrer, Jefferson City, Mo., spoke on "National Trends in the Organizational Patterns of Guidance Programs."

Rufus D. Pulliam, Atlanta, Ga., was the discussion leader.

(Continued on page 18A)

A Tribute to Charles Marvin Miller

CHARLES MARVIN MILLER, distinguished son of Tennessee and Kansas

In recognition of your outstanding Leadership in the field of Industrial Education, we of THE SHIP salute you. Your enthusiastic devotion to the great profession of teaching . . . your educational contributions as Lecturer, Consultant and Author . . . your enduring faith in our Industrial Education program which recognizes Individual Creative Thinking and Doing as vital factors in our American Way of Life . . . all these, combined with your readiness to serve and inspire our American Youth in such organizations as the "Future Farmers of America," have enabled you to give to our nation an Educational Leadership that will guide our youth in the ideals of American Democracy ● Charles Marvin Miller, Director of the Kansas State Board of Vocational Education, in the true American spirit you have served well your State and Country and in so doing you have inspired others to higher goals of endeavor ● Charles Marvin Miller, we of THE SHIP are honored by this privilege to pay tribute to you and your constructive Leadership. Again . . . we salute you . . . as we wish you many more years in which to guide American Vocational Education to even greater heights of achievement.

Given under our hand and seal this third day of December, One thousand, nine hundred and forty-eight, A. D. during the Forty-second Annual Convention of the American Vocational Association, held in the City of Milwaukee, State of Wisconsin.

The Ship — Ship's Committee on Recognition of Valuable Service

The citation presented by the Ship at the Milwaukee A.V.A. convention

Association News

A.V.A. CONVENTION AT MILWAUKEE

(Continued from page 33A of the March, 1949, issue)

On Thursday, December 2, 1949, at 2:00 p.m., the Industrial Education Division held a sectional meeting in which safety was discussed.

W. L. Newton, director of vocational education, Meridian, Miss., was chairman at this meeting. The panel who presented the subject consisted of Violett O'Reilly, New Orleans, La.; Thomas P. Garrity, Detroit, Mich.; E. G. Bruckman, Milwaukee, Wis.; Frank Huffaker, Chattanooga, Tenn.; Wayne P. Hughes, Chicago, Ill.; and Morris E. Siegel, New York City.

E. G. Bruckman then illustrated how color dynamic painting aided safety in school and industrial shops.

At the part-time education meeting held at 2:00 p.m. Thursday, George E. Manley, University, Ala., acted as chairman. John F. Ingram, University, Ala., presented a comprehensive picture of what co-operative part-time training is contributing to the total concept of national security.

The graphic-arts sectional meeting on Thursday afternoon was called to order by John R. Patlow, Milwaukee, Wis., who was chairman of the local committee on arrangements, and John G. Henderson, Chicago, Ill., the president of the National Graphic Arts Education Association, acted as cochairman at the meeting.

Emil G. Stanley, Evanston, Ill.; Lawrence Brehm, Racine, Wis.; Arnold J. Mickelson, Milwaukee, Wis.; and John T. Porter, Elizabeth, N. J.; spoke on typography, industry and printing

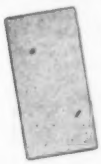
MAKE PROFESSIONAL LOOKING COPIES

A Stylus for Every Need

For illustrating, ruling, lettering, writing. New roll-point stylus for handwriting. Three dual-point, 2-in-1 styli. Designed for fast, easy use. Attractive colors for easy identification.

Many Styles of Letters and Numbers

Lettering guides of molded plastic. Greater thickness for strength, easy handling.



Attractive Shades and Patterns

Screen plates in new large size to dress up your mimeograph work with shadings in many patterns. Sturdy plastic, restful amber color.

Drafting Table Precision

The Mimeoscope ® illuminated drawing board helps you to fast, easy tracing, drawing, lettering. Shown here is the model 5 on Tiltoscope model 35 base.

Make your Teaching More Effective

Your instructions will be easier to understand—easier to follow—when each boy has his own clear copy of the lesson, outline, project, or detail sheet.

These copies can be produced quickly and economically on an A.B. Dick mimeograph. Easy duplication of anything typed, written, or drawn is only a matter of minutes with any one of A. B. Dick's many models.

You'll find just the mimeograph you want to fit your own requirements and budget in the complete A. B. Dick line. For use with all makes of suitable stencil duplicating products. Let your nearest A. B. Dick distributor show you all the advantages, or simply send in the coupon below.

Mimeographing Is ***BALANCED*** *Duplicating*

Brings you all the essentials—legibility, speed, versatility, easy operation, and low overall cost—with no sacrifice of one for another.

A.B.DICK

. . . the first name in mimeographing

Mail this Coupon for more information

New Accessories make professional looking copies

A. B. DICK COMPANY, Dept. IA-449
720 West Jackson Boulevard, Chicago 6, Illinois

Please send me more information on A. B. Dick mimeographs and new accessories.

NAME_____

SCHOOL_____

ADDRESS_____

CITY_____ STATE_____

SHELDON makes all 3!

Write for the new G-48 SHELDON Catalog showing and describing (with complete specifications) the complete line of 10", 11" and 12" Sheldon Lathes, accessories and attachments and Sheldon-Vernon Milling Machines and Shapers.

● THESE 3 quality machine tools are especially adapted to school use because of their:

Ample Size — permits wide range of practical projects.

Standard design — true industrial tools with standard contracts.

Permanent accuracy — these tools hold their accuracy under student abuse, do not require constant rebuilding and servicing.

Safety — all drives completely enclosed; all speed changes made by external levers.

Price — these are moderate priced tools that school shops can afford.

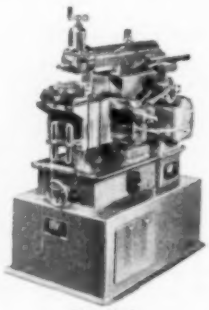
SHELDON MACHINE CO. Inc.

Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers

4244 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U. S. A.

No. 3000 MILLING MACHINE

No. TS 56 11½" SWING LATHE



No. 8000 12" SHAPER

(Continued from page 16A)

The officers for the year 1949 of the National Council of Local Administrators of Vocational Education and Practical Arts are: president, Howard E. Marvin, Pasadena, Calif.; vice-president for local directors, Frank Huffaker, Chattanooga, Tenn.; vice-president for trade school principals, Wm. E. Rasche, Milwaukee, Wis.; secretary, Albert E. Jochen, New Brunswick, N. J.; and treasurer, W. K. Begeman, St. Louis, Mo.

Roy G. Fales was elected chairman of the planning committee of the industrial-arts section.

On Friday evening the Ship's program was put on in its usual entertaining manner before a huge audience of interested spectators. Captain Bert Cholet, First Mate John A. Backus, and Deck Officer Chester Messmore, assisted by other members of the crew, did a most excellent job, and extravagant praise was heard on all sides as the audience left the Robert L. Cooley Auditorium at the end of the program.

The Ship's citation this year was presented to C. M. Miller, director of the Kansas State Board of Vocational Education, in recognition of his services in the field of vocational education.

At the House of Delegates meeting a new constitution was adopted which establishes an advisory council composed of representatives of the different divisions of which the A.V.A. is composed. This council, as its name suggests, acts in an advisory capacity only.

The new officers elected are: president, E. L. Williams, director, Industrial Extension Service, A. & M. College of Texas, College Station, Tex.; vice-president for agricultural education, Louis M. Sasman, Madison, Wis.; Charles W. Sylvester will continue as treasurer.

Atlantic City was chosen as the city where the 1949 convention will be held. The dates for the meeting are November 28, 29, and 30.

THE PRESIDENT OF THE A.V.A.

It may be interesting for our readers to get an intimate biographical sketch of E. L. Williams, director of the industrial extension service, Texas A. and M. College, College Station, Tex., who was elected president of the American Vocational Association at its annual meeting in Milwaukee, Wis.

A detailed biographical sketch follows.

Personal:

Edward L. Williams
Born, Sherman City, Mich., April 9, 1893
Veteran of World War I
Married Jane Wheeler of Winsted, Conn., the Supervisor of Public School Music in McKeesport, December 21, 1920
Two children; Jane Ann, 23, married to Dr. George T. Dugan, veterinarian; Edward L., Jr. (Bud), 21, a navy veteran, in Texas A. & M. College

E. L. Williams

Schooling:

Graduated from Muskegon High School and Hackley Manual Training School in 1913, and the Hackley Manual Training Normal Course in 1915 (Muskegon, Mich.). Hackley Manual Training School was one of the outstanding institutions of the time serving as a vocational school and a teacher training normal. It prepared many of the teachers in the field up to 1920.

B.S. degree from the University of Pittsburgh, Pittsburgh, Pa., 1925. Accumulated at the University of Pittsburgh credits from Hackley Normal, University of Wisconsin, Pennsylvania State College and Carnegie Institute of Technology. All work completed Saturdays, nights, and summers.

M.S. Degree, Texas A. & M. College, 1930

Public School Experience:

Elkins, W. Va., two years, industrial arts and evening trade extension classes for railroad shopmen, 1915–17.

McKeesport, Pa., patternmaking and drafting. Evening classes in blueprint reading and drafting. Installed the first day trade class in drafting in Pennsylvania. Supervisor one year — in McKeesport, 1917–22.

Braddock, Pa., director of vocational education, 1922–25.

College and University Experience:

Head of Department of Industrial Education, Texas A. & M. College, 1925–42. Both Industrial Arts and Trade and Industrial Teacher-Training.

Director of the Industrial Extension Service, Texas A. & M. College, 1940–present. Twenty-four extension teachers in the fields of T. & I. Teacher-Training, Public Service, Trade Extension and Industrial Supervision.

Other College and University Teaching:

Pennsylvania State College, 3 summers, 1922, 1923, 1925

Colorado A. & M. College, 5 summers, 1937, 1938, 1939, 1940, 1946
University of Pittsburgh, 1 winter term, 1924–25
State Department of Nevada, 1 summer, 1940
University of Texas, 3 summers, 1935, 1942, 1948
University of Minnesota, 1 summer, 1948

Practical Experience:

Two full years and nine summers as machine operator and millwright in various factories in Muskegon, Mich.
One year outside of school hours, drafting, Muskegon Extract Company, Muskegon, Mich.
Part of one summer, drafting, C.W.C. Foundry Co., Muskegon, Mich.
Six summers, carpenter, Michigan and Pennsylvania.
Two summers, sawmill work, West Virginia.
Friday and Saturday nights, during one school year, 1917–18, employed as machinist, Firth Sterling Company, McKeesport, Pa.

Organization Memberships:

Texas State Teachers' Association
Texas Vocational Association
American Vocational Association
National Association of Industrial Teacher Trainers
Iota Lambda Sigma Fraternity
Veterans of Safety
Registered Professional Engineer, Texas
American Society for Enginering Education

Offices Held in Organizations: (Year Elected)
Chairman, Industrial Education Section, Texas State Teachers' Association, 1929
President, Texas Vocational Association, 1933
Chairman of Teacher-Training Section of American Vocational Association, 1934
Chairman, Texas Life Membership Committee, American Vocational Association, 1936
Vice-Chairman, Teacher-Training Section of American Vocational Association, 1939
Vice-President, Texas Vocational Association, 1939
Vice-President, National Association Industrial Teacher-Trainers, 1945
President, National Association Industrial Teacher-Trainers, 1946
Vice-President, American Vocational Association, 1946, 1947
President, American Vocational Association, 1948

♦ The Pennsylvania Industrial Arts Teachers Professional Association enjoyed an excellent trip through the Pittsburgh Steel Company at Monessen, Pa., on February 23, 1949. T. F. Preston, director of vocational education at Monessen, was instrumental in contacting William Houston, general manager of the Pittsburgh Steel Company. The visitors were shown the blast furnace, open hearth, blooming and related processes.

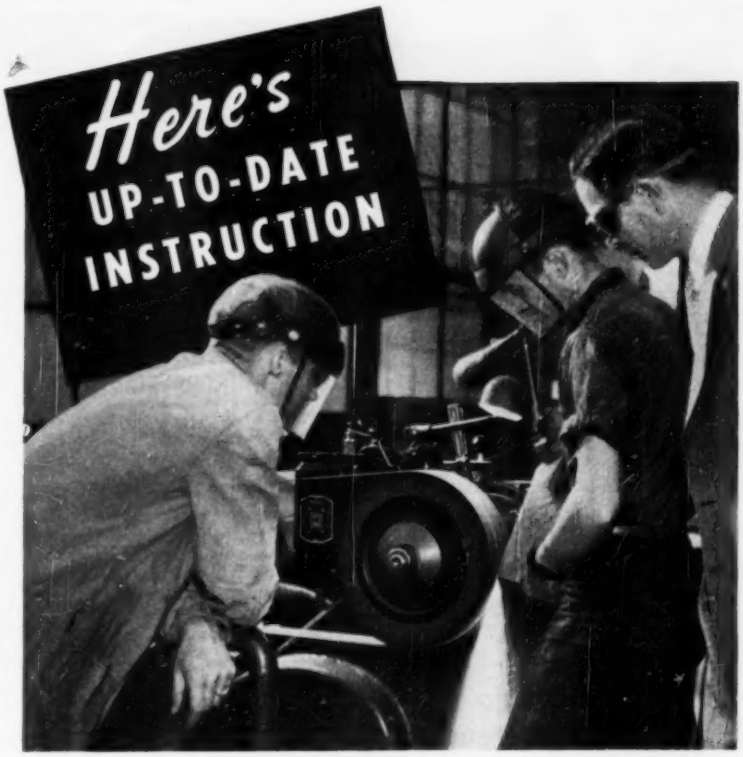
At the following meeting Robert F. Hutson was host in his general shop at Oakmont Junior High School.

It was decided to contact the Industrial Arts Associations in other sections of Pennsylvania to get their support for a round-table discussion group in the Pennsylvania State Education Association convention, which is held in December each year.

Plans were made for the meetings for the rest of the year. The invitation by Russel Rice to visit the Pennsylvania School for the Blind was accepted for the March meeting. The April meeting is planned in conjunction with the Industrial Arts Conference at the State Teachers College, California, Pa., which is to be on Saturday, April 23.

♦ The fourteenth annual Pennsylvania Industrial Arts Conference will be held at the State Teachers College, California, Pa., April 22 and 23, 1949. Dr. John Ludington of the U. S. Office of Education will be one of the speakers.

(Continued on next page)



The way industry does it

in grinding and finishing metal is by the belt-backstand method — fast becoming universal practice for more and more operations. Behr-Manning METALITE* Cloth Belts, fast, cool-cutting, enduring, have been a big factor in this development. Use these belts and the belt-backstand method in your teaching now.

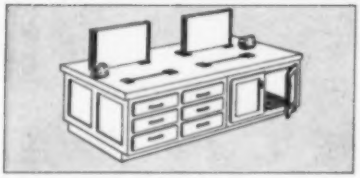
For hand or machine sanding on wood, metal, plastics, give your students a true picture of present-day production methods with the correct Behr-Manning coated abrasive disc, sheet or belt. Show him how these modern abrasives are cutting costs in industrial output everywhere. Ask your distributor, or write for catalog. Also complete educational program of teaching aids on request.

* *Reg. U. S. Pat. Off.*

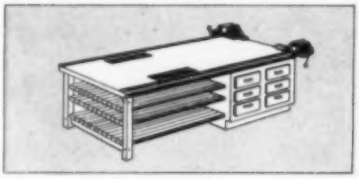
BEHR-MANNING · TROY, N. Y.

NORTON Abrasives

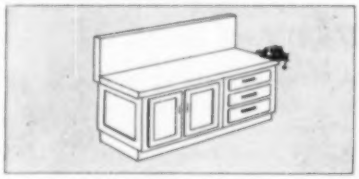
QUALITY COATED ABRASIVES FOR 76 YEARS



Wiring Bench



General Shop Bench



General Repair Bench

for **VOCATIONAL SHOPS AND INDUSTRIAL ARTS DEPARTMENTS**

Vocational training and Industrial Arts Experience cover a wide field - - a field which demands the use of a broad variety of equipment to meet specific uses and take abuse.

There is a practical Sheldon bench and cabinet for every type of vocational training and industrial experience application. While only three benches are shown here the complete Sheldon line is carried in the Sheldon Catalog. Our engineers will also assist you in determining exactly and economically the type and number of benches or cabinets needed for your particular purpose.

World's Largest Exclusive Manufacturers of Laboratory and Vocational Furniture.

E. H. Sheldon & COMPANY
MUSKEGON, MICHIGAN

(Continued from previous page)

♦ The Michigan Industrial Education Society will hold its annual convention on April 21, 22, and 23 at the Pantlind Hotel, Grand Rapids, Mich. The exhibits will be housed in the Civic Auditorium connected with the hotel by subway.

Joel W. Lee of Owosso, Mich., is president of the M.I.E.S.; vice-president is R. R. Fraser of Detroit; executive secretary-treasurer is Ward D. Sager of Mt. Pleasant, Mich.; and exhibits manager is Roy W. Chamberlain, Grand Rapids. Maurice Overholt of Grand Haven is in charge of convention arrangements.

Other educational organizations are meeting at the same time, and it is thought that the convention will be attended by a greater number of persons than ever before.

♦ The third annual national meeting of the Forest Products Research Society is to be held at the Civic Auditorium in Grand Rapids, Mich., on May 2 to 4, 1949. This meeting, which will be the only national meeting of the society this year, will be open to nonmembers as well as members.

Six technical sessions have been scheduled, in addition to the annual business meeting at which new officers will be installed for the coming year. The general subjects to be discussed include raw material and its preparation, furniture and plywood, chemical utilization of wood, machining of wood, technical development of research, and seasoning.

Plans for the meeting are under the general direction of Jac. H. Tigelaar, director of Research and Tests, Haskelite Manufacturing Corp., Grand Rapids.

♦ Ten members of the class of 1898 of the old Manual Training School, once affiliated with Washington University, St. Louis, Mo., celebrated the fiftieth anniversary of their graduation at an alumni dinner at Hotel DeSoto on November 23, 1948. The men from the class of '98 who attended were: Leslie Bright, Robert W. Bruner, Walter O. Haas, Charles Holman, James R. Holt, Elmer Ford Long, R. L. Murphy, Walter Rathmann, Carlos Tredway, and Dr. Hillel Unterberg.

Other members of the alumni of the old Manual Training School were: Harry M. Pflager of the class of 1884, Edward L. Lange, 1885, and Edward L. Dillon and William C. Zille from the class of 1886.

The officers of this alumni group for the coming year are: George Quermann, president; Frank C. Rauchenstein, vice-president; Ray D. Schaefer, secretary; and Albert H. Baum, Jr., treasurer.

♦ The Eleventh Annual Industrial Arts Spring Conference at the Oswego State Teachers College will be held this year on May 5 and 6. This year's conference is built around the general theme, "Industrial Arts for the One Hundred Per Cent."

Heading the list of invited speakers, will be Dr. John R. Ludington, specialist in industrial arts for the U. S. Office of Education. Dr. Ludington will deliver the keynote address, and also the Thursday evening banquet address.

Other speakers will include such outstanding men as Dr. Harry V. Gilson, associate commissioner of education for New York State; Frank Johnson, chief of the Bureau of Industrial and Technical Education; John B. Veach, representative of the Hardwood Corporation of America; Peter Furnari, chairman of the New York State Steering Committee; L. F. Livingston, manager of the Extension Division of the E. I. DuPont deNemours Co; Glenn Wagner, formerly of the New York State Education Department, and others.

In addition, a presentation by a representative of the National Safety Council will be made. There will be many demonstrations in various fields of industrial arts by the college students and also many demonstrations and exhibits by commercial manufacturers. Included among these will be an exhibit of new machinery for the industrial-arts shop. A group of from four to five hundred industrial-arts teachers, school superintendents, principals, and other educators are expected to attend. Extensive preparations are proceeding on all fronts to make this conference the finest ever experienced at Oswego.

♦ Dr. John R. Ludington, specialist in industrial arts, U. S. Office of Education, was the featured speaker in programs for industrial-arts teachers held November 23 and November 26, 1948.

On Tuesday night, November 23, more than 300 industrial-arts teachers and college students gathered at Southwest Texas State Teachers College, San Marcos, Tex. Arrangements had been made for the laboratories of the industrial-arts department to be open for visitation beginning at 6:00 p.m. At 7:30 the men assembled in the Little Theatre for a welcome by the dean, Dr. Alfred H. Nolle, after which Dr. Victor L. Bowers, chairman of the industrial-arts department of the college, introduced the speaker for the evening.

Dr. Ludington discussed "Industrial Arts from a National Point of View," after which considerable time was given to questions and discussions. After adjournment, the group were served refreshments by the Industrial Arts Club of the college.

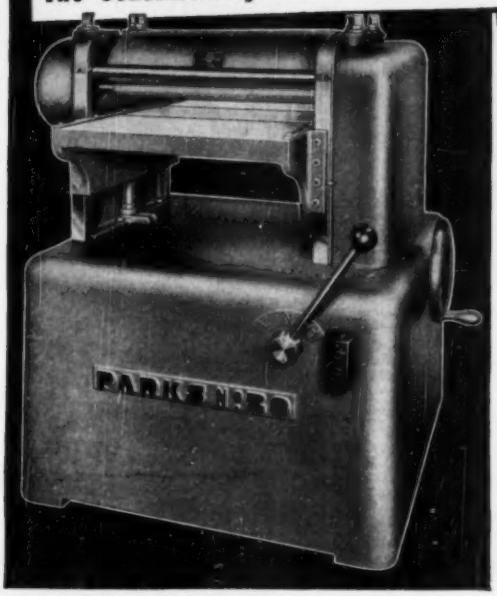
At least one half of the group were college students in training to be industrial-arts teachers. These students represented four teacher training colleges in Texas.

On November 26, Dr. Ludington was the main speaker for the Industrial Education Section, Texas State Teachers Association Convention, held at Dallas, Tex. Over 100 teachers were present for the program which also included a discussion of the National Industrial Arts Exhibit by John W. Tays of New Braunsfels, Tex.; and a demonstrated lecture on ceramics by Prof. A. F. Gross, director of industrial arts, A. & I. College, Kingsville, Tex.

During the business session the teachers elected a state committee for industrial arts consisting of the following:

(Continued on page 22A)

The Sensationally NEW Low-Priced



PARKS No. 20
20" PLANER

Here is a modernly designed, rugged, high-speed, low-priced planer that is ideally suited for every shop and industrial plant requiring a quality surfacer. The Parks No. 20 Planer has a four-knife cutterhead with a speed of 3600 R.P.M. and offers two feed speeds — 20 and 40 F.P.M., and 40 and 80 F.P.M. Write for complete descriptive literature.

The PARKS Heavy-Duty 12" x 4" Planer

A compact, sturdy, thickness planer that offers mill planer precision and ruggedness at a sensationally low price. Write for descriptive catalog sheet.

The PARKS WOODWORKING MACHINE CO., Dept. 22-AA, 1546 Knowlton St., Cincinnati 23, O.

Everything in PLASTICS
for
Plastic Craft Classes

OVER 1700 ITEMS IN STOCK!

For instance . . . we have on hand for immediate delivery a large stock of PLEXIGLAS, LUCITE, CELLULOSE ACETATE, in sheets, rods and tubes, clear and colored, in a full range of sizes and diameters. We also carry • Jewelry Findings • Plastic Handbooks • Power Tools • Polishing Compounds • Buffs • Cements • Dyes — many other items. In most cases we can make shipments same day orders are received.

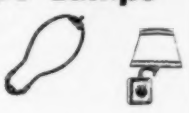
SEND FOR PRICE LIST AND CATALOG!

INSTRUCTORS: Accept FREE our 14-page price list, folder on Internal Carving of Plastics, Jewelry Findings Catalog — Information on Fabrication of Plastics — your buying guides for all plastic craft projects. Use school letterhead, stating your position. STUDENTS must send 25¢ for above material, which will be deducted from first order.

PLASTIC PARTS & SALES Dept. S-2049
1157 S. Kingshighway, St. Louis 10, Mo.

FASCINATING and EDUCATIONAL
Make Unique Type Lamps

From Parts We Supply FOR ANTIQUES or HOBBIES • Save Money •



We offer you the most complete line of lamp parts in the country. Lamp parts of all kinds. Harps, Sockets, Cords, Plugs, All Types of Fittings, Bases, China; to make most popular table and floor lamps. Instructors and teachers: have your students make lamps that can be sold at large profits. We furnish parts that are necessary at wholesale prices. Send for Catalog NOW so you can plan your semester, using lamps as one of your projects.

Write Today

For FREE Catalog: Shows You How.

THE GEARON COMPANY 27 So. Desplaines St., Chicago 6, Ill. Dept. 100-K4

STRENGTH OF MATERIALS

by

Charles O. Harris

Engineers are not the only ones who need *Strength of Materials.* There are many others in Industry who need a basic knowledge of this subject, and this book has considered their needs as well as those of the engineer.

The careful, step-by-step manner in which each topic has been developed makes it possible for the reader to obtain the maximum benefit from this book.

From beginning to end it is practical. It will provide the reader with simplified discussions of the problems he will frequently encounter. Without the use of higher mathematics, the reader will be able to quickly solve such problems.

This book is as up to date as the most modern developments in industry. The analysis and design of welds is given emphasis commensurate with their wide use in industry today; care is taken to acquaint the reader with the great variety of new materials now being used by industry; and the author gives the reader the advantage of his contacts in the various fields of engineering.

The value of this book will be reflected in the efficiency and progress of its readers.

LIST PRICE, $4.90

Dept. W354

Please rush a copy of **Strength of Materials** to me on 30 days' examination.

Name .....

School .....

School Address .....

City ..... Zone ..... State .....

AMERICAN TECHNICAL SOCIETY

Publishers Since 1898

DREXEL AVENUE AT 58th STREET
CHICAGO 37, ILLINOIS

(Continued from page 20A)

Top row, left to right: L. B. Hardeman, A. & M. College; D. W. Harris, State Teachers College; C. H. Groneman, A. & M. College; A. F. Gross, A. & I. College, W. E. Wright, A. & M. College
Seated: V. J. Smith, Sul Ross State College; John R. Ludington, specialist in industrial arts, U. S. Office; Victor L. Bowers, State Teachers College; D. K. McGee, president, Industrial Arts Club, San Marcos; K. J. Herbert, State College; and J. B. Snodgrass, State Teachers College, Huntsville

Chairman, Chris H. Groneman, A. & M. College of Texas, College Station; Victor L. Bowers, State College, San Marcos; John Cherry, supervisor of industrial arts, Fort Worth; Ed McCluney, Houston; Perry Fite, Dallas; Scottie Williamson, Wichita Falls; and Odus Curley, Dallas.

This committee will serve in an advisory and consultancy capacity to the state superintendent of public instruction, and for administrators, teachers, and committees concerned with the organization and teaching of industrial arts in the public schools of Texas. — *Victor L. Bowers.*

♦ Below is a picture of the Industrial-Arts Teacher Trainers at their annual meeting at Richmond, Ky., November 19 and 20, 1948.

Front row, left to right: H. L. Oakley, Murray State College; N. G. Deniston, Eastern State College; L. T. Smith, Western State College; J. T. Mays, Morehead State College; J. G. Black, Jr., Morehead State College; and D. C. Barnes, Eastern State College
Second row: George T. Lilly, Murray State College; H. B. Clark, Western State College; R. W. Whalin, Eastern State College; W. B. Nalbach, Western State College; and C. B. Barnes, Western State College

Those who attended visited the industrial-arts shops at Eastern State Teachers College, Richmond, Ky., as well as the industrial-arts and production program at Berea College in addition to having a conference and business meeting at which the teacher training program was discussed.

♦

Falls, always a heavy killer, brought death to 27,000 persons in 1948, or 3 per cent more than in 1947. — *National Safety Council.*

BETTER METALS for BETTER HANDICRAFT

Give your metalcraft work a perfect start — by using high quality METAL GOODS handicraft metals. They're easy to work — and assure lasting satisfaction in your handicraft.

- **ALUMINUM and COPPER CIRCLES** . . . For attractive trays, coasters and other useful articles.
- **BRACELET BLANKS and RECTANGULAR SHEETS** . . . of Aluminum, Brass, Copper and Stainless Steel. Ready for your artistic touch.

YOURS FOR THE ASKING . . .

"Making Aluminum Trays and Coasters", an interesting and helpful booklet as well as the copper-craft bulletin for beginner or experienced craftsmen. Write for your FREE copy and Metal Goods price list today.

METAL GOODS CORPORATION

Dept. IA
5239 Brown Ave., St. Louis 15, Mo.

Personal News

♦ CLARENCE E. DAVIES, of New York City, secretary of the American Society of Mechanical Engineers, has been elected a term trustee of Rensselaer Polytechnic Institute, from which he was graduated in 1914.

Mr. Davies during the war was chief of the control division, Office of the Chief of Ordnance, with the rank of colonel, and was awarded the Legion of Merit. He is a native of Utica and a former president of the Newcomen Society of England.

♦ JOHN A. STORM has been named assistant professor of education at the Oswego State Teachers College of Oswego, N. Y. He has assumed the duties of teaching industrial-arts education classes as well as supervising student teachers in various centers throughout New York State.

Mr. Storm received both his B.S. and M.S. from Syracuse University, and is now doing work on a doctorate at Syracuse and Columbia. He taught industrial arts in the high school at Marathon, N. Y., and in the junior and senior high schools of Yonkers, N. Y. He also worked for some time with the Remington Trade School at Ilion, N. Y. In service, Mr. Storm became the director of the navy's schools for Electrician's Mates and Machinist's Mates.

♦ JOHN E. GERNGROSS, Laurel Springs, N. J., has been named assistant to the dean of the graduate school at Illinois Institute of Technology.

He received his master's degree as a Westinghouse fellow in power systems engineering at Illinois Tech at the recent winter commencement.

Mr. Gerngross obtained his bachelor's degree in electrical engineering in June, 1947, from Virginia Polytechnic Institute. He is a member of Tau Beta Pi, Eta Kappa Nu, and Phi Kappa Pi honorary societies.

♦ Beginning the second semester, ROBERT A. FERGUSON, who has been a student at the Kansas State Teachers College, Pittsburg, Kans., joined the faculty of the Oklahoma City, Okla., public schools as an instructor of printing.

♦ FRANK E. ROBINSON has been appointed to the position of instructor in the general shop of the Oswego State Teachers College, at Oswego, N. Y. Mr. Robinson received both his bachelor's and master's degrees from the University of Missouri, at Kansas City, Mo. He then taught for two years in the high school of Lee's Summit, Mo., and then in the University of Missouri Training School for a period of two years. On leaving Missouri, Mr. Robinson went to the State Teachers College at California, Pa., where he taught advanced woodshop, electric shop, electric theory, and patternmaking.

♦ IRVING C. PERKINS, director of industrial-arts, State Teachers College, Buffalo, N. Y., begins a five-month sabbatical leave, during which time he will visit many teacher colleges west of the Mississippi, which offer industrial arts. He will spend one month of his time studying the arts and crafts in Mexico, and will return to his office on July first. During his absence, Emerson E. Neuthardt will be chairman of a managing committee assisted by Edward L. Morrice, Donald G. Brossman, and George M. Quackenbush.

♦ GARLAND G. HAMMER was recently appointed associate professor of industrial education at the Agricultural and Mechanical College of Texas, College Station, Tex. Prior to his joining the Texas school, he was assistant professor of industrial education at the University of Oklahoma, Norman, Okla.

Mr. Hammer has had ten years of successful teaching experience in Texas junior and senior high schools. During World War II he served on the civilian staff at the Air Technical Training Center at the Navy Pier in Chicago in the capacity of teacher trainer.

(Continued on page 28A)

Over 100,000 of Kester flux-core Solder

Types and Sizes Available

Standard for Industry Since 1899

Every student should be acquainted with the following facts about Kester Flux-Core Industrial Solders. Made with a single core or opening. 68 different strand sizes available. Core sizes ranging from an opening that contains ½ of 1% to 7% of flux by weight. All practical alloys ranging from all lead to all tin. 8 types of major fluxes.

POSITIVE FLUX UNIFORMITY

LABORATORY CONTROLLED

FREE: Kester's New Technical Manual

"SOLDER and Soldering Technique." A complete analysis of the properties and application of soft solder alloys and soldering fluxes. Get your copy now.

1899 50th Anniversary 1949

KESTER SOLDER COMPANY

4201 Wrightwood Avenue, Chicago 39, Illinois

Factories Also at

Newark, New Jersey • Brantford, Canada

KESTER SOLDER

Hotpack ELECTRIC HEAT TREATING FURNACE

● Hardening, drawing, tempering and annealing or normalizing of dies, punches, gages, and fixtures or other parts are performed readily with redesigned Hotpack electric box furnaces. Made in three sizes with from 165 to1680 cubic inches of working space, they operate in range of 300° F. to 2000° F. Automatic indicating-controlling pyrometer calibrated in fahrenheit and centigrade is built-in. Limitstat automatically turns off furnace at preselected temperature. Pilot lights indicate operation of electric heating elements which are encased in ceramic. Elements can be serviced conveniently. Heat loss is prevented by ample insulation, and welded steel cabinet is finished in black wrinkle enamel.

Write for catalog sheets with complete details.

The ELECTRIC HOTPACK CO., Inc.
5067 Cottman Street Philadelphia 35, Pa.

New and Timely Books for Your Vocational Program

ARCHITECTURAL DRAWING FOR THE BUILDING TRADES — *Kenney and McGrail*
MECHANICAL DRAWING — New 5th Edition — *French and Svensen*
PRACTICAL SHOP MATHEMATICS — New 3rd Edition, Volumes I and II — *Wolfe and Phelps*
BASIC ELECTRICAL PRINCIPLES — *Suffern*
MATHEMATICS FOR ELECTRICIANS — New 3rd Edition — *Kuehn*
CARPENTRY MATHEMATICS — New 2nd Edition — *Wilson and Rogers*
WORKBOOK IN MECHANICAL DRAWING — *Coover*
AUTOMOTIVE MECHANICS — *Crouse*
WORKING WITH PLASTICS — *Dunham*
ELEMENTS OF RADIO SERVICING — *Marcus and Levy*
INTRODUCTORY RADIO — Theory and Servicing — *Hicks*
CARPENTRY FOR THE BUILDING TRADES — *Lair*

Write for Vocational Catalogue

McGRAW-HILL BOOK CO., INC. 330 West 42nd Street New York 18, N. Y.

MYSTIK TAPE

in Colors and Widths to Serve Many Purposes

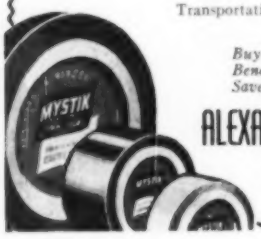
● MYSTIK TAPE is available to you in seven beautiful colors, in six widths and in several lengths. We carry the only complete stock and your order can usually be shipped the same day received.

Alexander-Stafford Prices:

Colors: Black, Brown, Green, Red, Blue, White, Wine

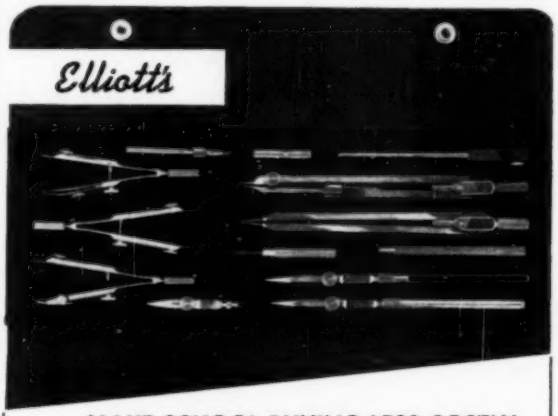
Width	144 In.	720 In.	60 Yds.
¼"	$ .25	$1.00	....
1"	....	....	$2.10
1½"	.50	....	3.15
2"	.67	2.67	4.20
3"	1.00	4.00	6.30
4"	1.34	5.34	8.40

Transportation paid in U.S.A. — Terms: 2% Net 30 days



Buy MYSTIK TAPE in large size rolls. Benefit from reduced cost per foot. Save up to 62%.

ALEXANDER STAFFORD CORP.
1 Ionia Avenue, N.W.
Grand Rapids, Michigan



. . . MAKE SCHOOL BUYING LESS COSTLY
Ask for
Elliott's New Catalog
You'll Find It Mighty Valuable When Making Up Your Requisition For Drawing Materials

DRAWING INSTRUMENTS ● DRAWING SETS
T-SQUARES ● TRIANGLES
DRAWING PAPERS ● SCHOOL SUPPLIES

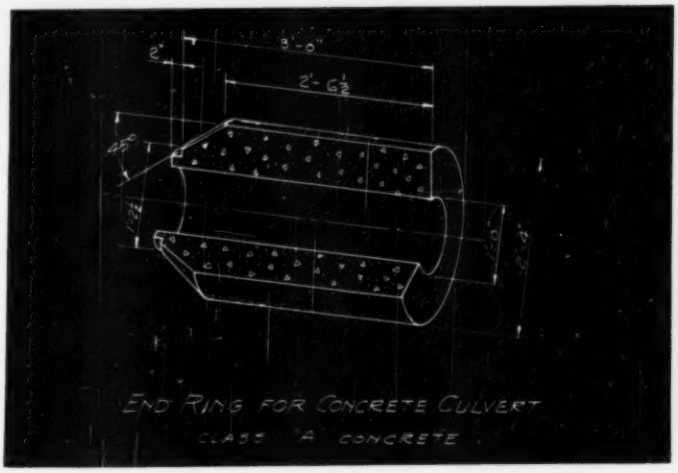
B. K. ELLIOTT CO.
126 Sixth St. GRant 3660 Pittsburgh, Pa.

END RING FOR CONCRETE CULVERT

#2 in Dixon's latest series. Widely-used, highly-praised EldoradoStats are yours for classroom use, free.

This helpful, practical series of Civil Engineering drawings are designed especially for classroom use. Thousands of teachers and students use them. We'll send you these EldoradoStat Problems and Solutions, from which you can make as many blueprints as needed for classroom distribution.

Have your pupils draw correct orthographic views with famous Typhonite ELDORADO pencils, using the same leads (2H & 3H) as the draftsman used in the original problem and solution.



DIXON'S TYPHONITE ELDORADO

If you are not already receiving these problems, write to the address below and your name will be placed on our mailing list.

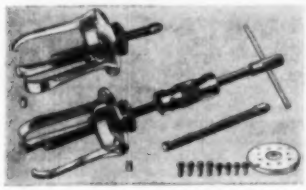
SCHOOL BUREAU, PENCIL SALES DEPT., 128-J4, JOSEPH DIXON CRUCIBLE COMPANY, JERSEY CITY 3, N. J.

Shop Equipment News

NEW PRODUCTS — PUBLICATIONS

A NEW PULLER BY SNAP-ON TOOLS CORPORATION

Snap-on Tools Corporation announces a new addition to its puller line, known as the CG-273. It is a three-jaw puller that produces safe, uniform power and can easily be used by any mechanic. Spring tension holds the jaws on the work, and a locking nut makes it possible to actually *lock* the puller on the job so it will not come off until released. This assures slipless, tipless pulling of all jobs within the jaw capacity.



The CG-273 puller

The specially heat-treated jaws have a capacity on outside holds of 8½ in., and a 2½-in. capacity for inside pulls on bearings, sleeves, etc.

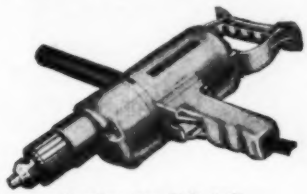
The puller is available as either a screw type or combination of screw and booster hammer type. As a screw type it can be operated with any ¾-in. wrench in the usual manner, and, as the screw has a centering tip, it automatically centers on all "turned" shafts. For shafts without centering holes a special screw point protector is provided to protect this point from damage.

For further information address the Snap-on branch servicing your locality, or write to Snap-on Tools Corp., Kenosha, Wis.

For brief reference use IAVE—0401.

NEW STANLEY DRILL No. 112

A new, compact, lightweight, general purpose ½-in. capacity electric drill, No. 112, has recently been announced by Stanley Electric Tools, New Britain, Conn. An important feature of this new drill is the chuck spindle offset which permits the operator to drill in close quarters without removing pipe or spade handles.



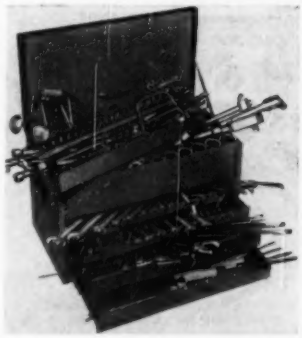
Stanley No. 112 drill

Other features of the Stanley No. 112 Drill include alloy steel gears, thrust ball bearing on spindle, strong aluminum alloy housing, automatic release safety switch with locking device and Jacobs three-jaw chuck. A bench stand No. 524 is available in which No. 112 can be mounted to make a convenient drill press.

For brief reference use IAVE—0402.

"SUPERCHEST" No. 2001

Williams new "Superchest" No. 2001, contains a combination of "Supersockets" and attachments in ¼, ⅜, ½, and ¾-in. drives; "Superrenches," pliers, chisels, screw drivers, etc., totaling 146



No. 2001 Superchest

pieces in all. Every tool has been carefully selected to cover a wide range of work from ignition and electronics to truck, bus, and industrial applications.

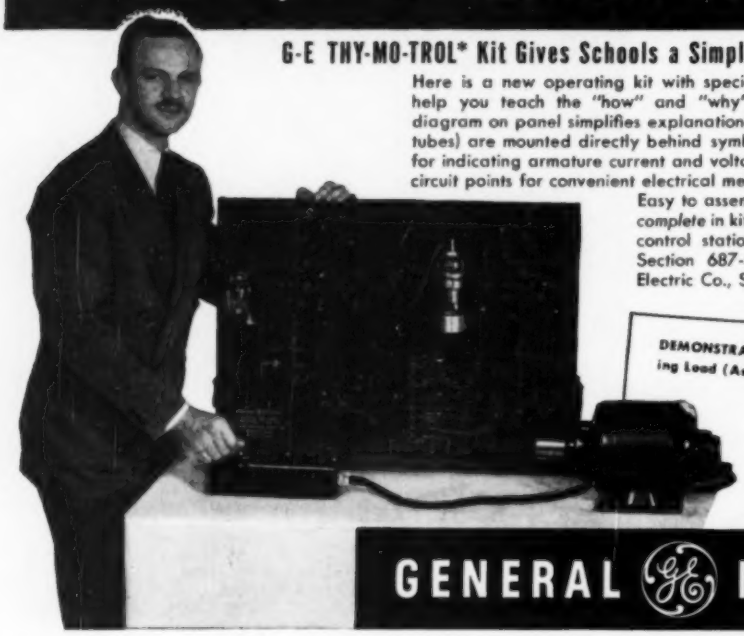
(Continued on next page)

Here's a new way to teach ELECTRONIC MOTOR CONTROL

G-E THY-MO-TROL* Kit Gives Schools a Simple, Practical Teaching Aid

Here is a new operating kit with specially designed control panel to help you teach the "how" and "why" of electronic control. Circuit diagram on panel simplifies explanation of operation. All parts (except tubes) are mounted directly behind symbols. Equipment includes meters for indicating armature current and voltage, and jacks at all important circuit points for convenient electrical measurement.

Easy to assemble, this equipment is supplied *complete* in kit form, including ½-hp motor and control station. For more information, write Section 687-8, Apparatus Dept., General Electric Co., Schenectady, N. Y.


DEMONSTRATES: Constant Speed with Varying Load (Adjustable Speed Control from 50 to 1750 rpm)
Phase Shifting
A-c Power Rectification
Grid Control of Thyratrons
Dynamic Braking
*THYratron MOtor ConTROL

GENERAL ELECTRIC

(Continued from previous page)

The "Superchest" is constructed of reinforced and welded heavy gauge steel. Drawers with handy compartments operate on free-acting suspension slides. The removable *tote* tray gives easy access to the roomy interior and has convenient compartments which keep sockets at proper height within easy reach. A cylinder lock on the hinged front panel securely locks the entire chest.

The firm also issued a new booklet, No. A-50, which describes these sets and the complete "Supersocket" and "Superrench" lines. Get your copy by writing J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y.

For brief reference use IAVE—0403.

AN EFFICIENT COLLOTYPE PRESS

The Laszlo Collotype Press, marketed by the Rembrandt Graphic Arts Co., Inc., 165 East 60th Street, New York 22, N. Y., is a portable, heavy duty, roller press for plastic, glass, metal, and paper collotypes and bromoil prints. It is delivered in dismantled condition packed in a 19 by 8 by 34-in. box.

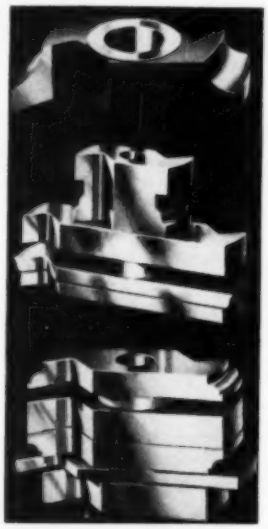
Laszlo Collotype press

The press comes equipped for printing plastic, paper, film, and metal plates up to 1/16 in. in thickness, and for plates mounted on type-high blocks. The press also permits close registry for color printing.

For brief reference use IAVE—0404.

NEW TYPE SHAPER CUTTERS

Boice-Crane Company, 932 W. Central Ave., Toledo 6, Ohio, are marketing a new type shaper cutter titled Tru-Form Relief Safety Cutters.



New style shaper cutters

The shape is machined into the cutter on an arc that assures clean cutting without burning. All the advantages of old-style flat knives are retained but with a much wider margin of safety.

The same true original shape and dimensions are cut right up to the last sharpening. Tru-Form Relief Safety Cutters provide up to 50 per cent more usable life.

Only fine, tungsten tool steel, deep hardened and oil tempered, is used in these precision-formed, razor sharp Tru-Form Relief Safety Cutters. They come in authentic, full-sized commercial shapes. The average diameter of 3¼ in. means higher peripheral speed.

For brief reference use IAVE—0405.

THE JUNIOR WOODWORKER'S VISE

The Morgan Vise Company, 108–128 North Jefferson St., Chicago 6, Ill., has placed a junior woodworker's vise on the market which will be welcomed in school and home shops.

Junior woodworker's vise

It is of the same quality as the larger vises made by this firm. It has a solid nut with continuous screw. The jaw width is 7 in., depth 3 in., and the vise opens to a length of 7 in.

For brief reference use IAVE—0406.

SPEED SAW FILER

The speed saw filer, distributed by the E. C. Atkins and Co., 471 S. Illinois St., Indianapolis 9, Ind., is an accurately made precision tool that has been thoroughly tested and approved by carpenters, woodworkers, machinists, and home craftsmen. The tool makes precision saw filing

(Continued on page 28A)

New Texts To Serve Your Needs

DELMAR Publications
INDUSTRIAL • TECHNICAL

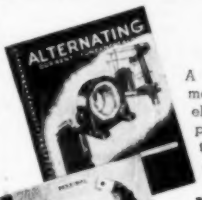
BRICKLAYING

Prepared with the cooperation of the Structural Clay Products Institute. This new publication emphasizes the coordinated development of Related Technical Information with the Manipulative Skills of the Trade. Each unit includes (1) Related Information consisting of Masonry Materials; Tools, Equipment & Safety; Trade Mathematics, Estimating; Trade Drawing; Details of Construction; and, Shop Practice, including Suggested Job Projects. A first year course for the Bricklayer apprentice or student.

216 pages . . . $2.75
Deluxe Clothbound $3.75

● CARPENTRY SERIES

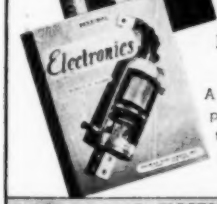
HAND TOOLS AND PORTABLE MACHINERY	$1.75	*Cloth*	$2.75
CONCRETE FORM CONSTRUCTION	$1.65	*Cloth*	$2.65
FRAMING, SHEATHING AND INSULATION	$2.45	*Cloth*	$3.50
INTERIOR AND EXTERIOR TRIM	$2.45	*Cloth*	$3.50
SIMPLIFIED STAIR LAYOUT	$1.50		



A-C FUNDAMENTALS

by Clarence H. Bensman

A basic student text and laboratory manual covering principles of A-C electricity and their application. Each principle explained, then demonstrated through experiment. New, revised, complete.



INDUSTRIAL ELECTRONICS

by Harold W. Ranney

A comprehensive laboratory text on principles and operation of electronic tubes in industrial electronic control circuits. An advanced text, right up-to-the minute.

● ELECTRICAL-RADIO SERIES

DIRECT CURRENT FUNDAMENTALS	$2.25
ELECTRICAL MEASUREMENT	$1.20
ELECTRICAL CIRCUIT DIAGRAMS	$1.20
FUNDAMENTALS OF RADIO RECEIVERS	$2.75
ELECTRIC MOTOR CONTROL	$2.45
CATHODE RAY OSCILLOGRAPH IN INDUSTRIAL ELECTRONIC CIRCUITS	$3.50

METHODS OF TEACHING INDUSTRIAL SUBJECTS

— by Gerald B. Leighbody

Basic methods of teaching skills in the shop, and related technical information in the classroom, are discussed in this new book. Problem material provides actual experience in applying various teaching methods.

177 pages Deluxe Cloth bound $3.50

● TEACHER TRAINING

TEACHING RELATED INFORMATION $1.40

Write Dept. IA 49 for Examination copies

DELMAR PUBLISHERS INC.
ALBANY 1, NEW YORK

TEACH YOUR STUDENTS to use the RIGHT HAMMER for the Job

Stanley No. 51½ — 16 oz. Nail ... head forged from special analysis steel, super-heat - treated. Young, straight grained hickory handle pre-shrunk and securely wedged in head.

Stanley No. 232 — 9 oz. Machinist's Riveting ... head is super - heat-treated—for extreme toughness. Has pre-shrunk hickory handle.

Stanley No. 310 — 16 oz. Ball Pein ... polished head of super-heat-treated steel with pre-shrunk, selected white hickory handle.

Stanley No. 594 Soft Face . . . Renewable tips of tough, resilient celluloid composition. Pre-shrunk hickory handle secured in steel center body. 8 oz. head.

Other sizes available.

By keeping an adequate supply of various *types* of hammers in your shop and insisting that students use the correct type for specific work you will be encouraging better shop efficiency on the part of every student in your classes.

In the broad line of Stanley Hammers are types eminently fitted for a wide variety of work—tested and proven in schools and in industry—over a long period of years.

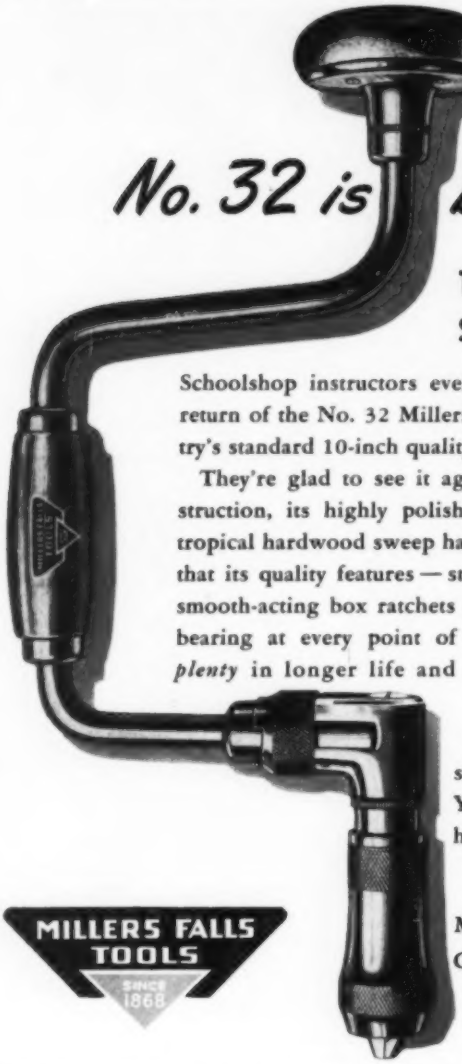
Standardize on Stanley Hammers for maximum utility and use. Stanley Tools, Educational Dept., New Britain, Conn.

THE TOOL BOX OF THE WORLD

STANLEY

Reg. U.S. Pat. Off.

HARDWARE • HAND TOOLS • ELECTRIC TOOLS • STEEL STRAPPING



No. 32 is back again

THE FAVORITE FOR SCHOOLSHOP USE!

Schoolshop instructors everywhere are welcoming the return of the No. 32 Millers Falls bit brace — the country's standard 10-inch quality brace.

They're glad to see it again because of its fine construction, its highly polished buffed nickel finish, its tropical hardwood sweep handle and head. They know that its quality features — steel-clad ball bearing heads, smooth-acting box ratchets with ring-shift control, ball bearing at every point of possible wear — count for *plenty* in longer life and smooth operation!

Are you providing your students with this fine brace? You can — by visiting your hardware dealer right away!

MILLERS FALLS TOOLS SINCE 1868

MILLERS FALLS COMPANY
Greenfield • Massachusetts

(Continued from page 26A)

easy for even the most inexperienced saw owner.

In appearance, the Speed Saw Filer resembles an ordinary triangular file with a handle, but, anchored to the file end of the handle, is a 2-in. clamp which extends out at right angles to the file and is equipped with a round rod which runs along parallel to the file. At the end of this rod is another clamp which fits over the end of the file. Sliding freely on the rod is a guide which is round and has two flanges designed to fit over the toothed edge of the handsaw.

This guide may be swung to five different positions so that the file will move either at right angles to the blade or at various angles. Two positive adjustments set the correct pitch and angle for any type of handsaw — and the Speed Saw Filer is ready for use. These adjustments are maintained throughout the filing operation.

The Speed Saw Filer is useful in filing crosscut and ripsaws and can also be clamped to a beam over the workbench for doing accurately controlled filing. Each Speed Saw Filer comes complete with file and is ready for use. An instruction sheet is attached to each tool.

For brief reference use IAVE—0407.

DISSTON NEW HACK SAW FRAMES

A new line of hack saw frames has been announced as an addition to the line of hand tools produced by Henry Disston & Sons, Inc., of Philadelphia 35, Pa.

New Disston hack saw frame

Four frames are being manufactured incorporating the latest improvements in design and construction. They are sturdily made of polished nickel-plated steel, with plastic handles designed for comfortable grip and easy handling. They may be used with all standard blade sizes, and are adjustable to four cutting positions — teeth facing right or left, up or down.

The four frames are numbered 338, 348, 358 and 368.

For brief reference use IAVE—0408.

NEW WALL CHART SHOWS TAP DRILL SIZES

"Tap Drill Sizes," fourth in the South Bend series of wall charts, is ready for distribution. It is 13 by 19 in., with white lettering on a dark blue field. This chart covers American National Screw Thread pitches as established by the National Screw Thread Commission authorized by the Congress of United States in 1928 and subsequently approved for general use. Sizes of threads, threads per inch, outside diameter of screw, tap drill sizes, and decimal equivalent of drill are given for National Coarse Standard Threads (N.C.), formerly U.S.S.; National Fine Standard Threads (N.F.), formerly S.A.E.; and Special Threads (N.S.).

Other wall charts in the South Bend series are: "Principal Parts of a Lathe," "How to Become a Machinist," and "Decimal Equivalents." Copies may be obtained by writing to the South Bend Lathe Works, 178 East Madison Street, South Bend 22, Ind., and enclosing 10 cents in coin for each wall chart ordered. Sample copy mailed on request, without charge, to any vocational school director or instructor.

For brief reference use IAVE—0409.

BOOKLET ON AUGER BITS

A booklet showing how to select, use, and care for auger bits may be obtained free by writing to The Irwin Auger Bit Co., Wilmington, Ohio.

The book describes in detail how to determine whether the auger bit is functioning properly, how to resharpen the spur and cutter, how to prevent rust, and how to choose the right bit for a given job.

For brief reference use IAVE—0410.

LOOK SHARP AT YOUR CUTTERS

Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio, has just issued a booklet titled "Look Sharp at Your Cutters," which is an excellent guide for anyone concerned with grinding milling cutters.

It contains only tables, drawings, and charts, and is completely devoid of descriptive text.

It is a nonadvertising booklet which the firm will be glad to send to those who request them.

For brief reference use IAVE—0411.

EDUCATION FOR ALL

McKnight and McKnight, 109–111 West Market St., Bloomington, Ill., have published the talk by J. C. Woodin, outlining his campaign to sell the voters of Wichita, Kans., on the need for a vocational-technical high school to meet the educational requirements of the young people of the community.

This publication, which has been titled "Education for All," will be sent free to teachers of industrial arts and vocational education who will write for it.

For brief reference use IAVE—0412.

PERSONAL NEWS

(Continued from page 23A)

At the conclusion of the war, he joined the General Motors Institute of Technology as an executive trainer until he returned to the teaching profession at the University of Oklahoma.

♦ MARVIN H. SEGLEM, who has been doing work for the master's degree at the Kansas State Teachers College, Pittsburg, Kans., has accepted a position as instructor of industrial arts in the Ashland, Kans., schools.

(Continued on page 30A)

Oswego State Teachers College **Summer Session**

DIVISION OF INDUSTRIAL ARTS

SIX-WEEK SESSION

July 5 to August 12

TWO FOUR-WEEK SHOP SESSIONS

July 5 to July 20 — August 1 to August 26

Graduate Program — Masters Degree

Under Graduate Program — B.S. in Education

Industrial-Vocational Courses

SPECIAL WORKSHOP IN GENERAL CRAFTS

July 5 to July 15

INDUSTRIAL ARTS SHOP COURSES

WOOD • METAL • PRINTING • CERAMICS

ELECTRICITY • TRANSPORTATION

For Further Information Write:

DIRECTOR OF SUMMER SESSION

STATE TEACHERS COLLEGE

Oswego, New York

OREGON STATE COLLEGE

A Cool Western Summer School Between Mountains and the Sea

Summer Session June 20-August 12

Formal study in scenic surroundings, with the Pacific beaches only two hours away and with week-end trips to the Cascade Mountains, Crater Lake, Oregon Caves, Cascade Lava Beds, and Columbia River Highway.

Combine the values of RECREATION, TRAVEL and STUDY. Do your graduate or undergraduate work at a school widely recognized for its work in Industrial Arts teacher education.

The student may plan a program which will lead through successive summers to the bachelor's or master's degree. Approved programs are accepted by all state departments of education for either a *Special* or a *General Secondary* Credential.

See the half-page advertisement in the March issue of this magazine for a full list of courses available in the Industrial Education Program.

For Summer Session Bulletin and details:
Address: Dept. V of Industrial Education

OREGON STATE COLLEGE
CORVALLIS, OREGON

AUTHORIZED BY STATE BOARD OF HIGHER EDUCATION

SUMMER SESSION
SOUTHERN CALIFORNIA

SUMMER SESSION — June 20 to July 3
POST SESSION — August 1 to August 27

Students will find numerous offerings in the Graduate School, in the College of Letters, Arts, and Sciences, in the Colleges of Architecture, Commerce and Business Administration, Engineering, Music, and Pharmacy; in the Schools of Education, Journalism, Library Science, Public Administration, Religion, and Social Work, and in the departments of Occupational Therapy, Physical Therapy, Radio, and Cinema.

Special rates for teachers in active service.

Special opportunities are offered in the fields of Art, Music, Drama, Audio-Visual Education, Remedial Reading, Speech Correction, School Administration, Counseling and Guidance, Intercultural Education, Communications.

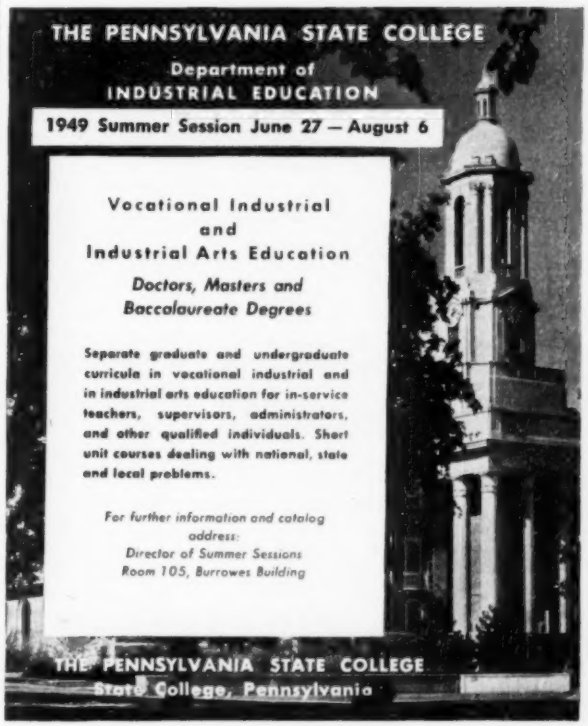
Organized social and recreational program.

SIX WEEKS — June 20 to July 30
FOUR WEEKS — Aug. 1 to Aug. 27
TEN WEEKS — June 20 to Aug. 27

Rooms are available on and near the campus.

Write to Director for Summer Session Bulletin

UNIVERSITY OF SOUTHERN CALIFORNIA
Los Angeles 7, California


THE PENNSYLVANIA STATE COLLEGE
Department of
INDUSTRIAL EDUCATION
1949 Summer Session June 27 — August 6
Vocational Industrial
and
Industrial Arts Education
Doctors, Masters and
Baccalaureate Degrees
Separate graduate and undergraduate curricula in vocational industrial and in industrial arts education for in-service teachers, supervisors, administrators, and other qualified individuals. Short unit courses dealing with national, state and local problems.
For further information and catalog address:
Director of Summer Sessions
Room 105, Burrowes Building
THE PENNSYLVANIA STATE COLLEGE
State College, Pennsylvania

SAVES TIME
SAVES WORK

The Plumb Hatchet is one of the most useful hand tools made. For occasional work that is required—in home or shop—this many-purpose tool should be kept on hand. Get a Plumb hatchet today. It will do the job better, save your time—and in the long run it will save you money, too. Good craftsmen know that when a job has to be done, a Plumb will do it faster and better. Fayette R. Plumb, Inc., Phila. 37, Pa.

The red handle with the black head —exclusively Plumb

PLUMB

HAMMERS • HATCHETS • AXES • FILES

TRAINING DIRECTOR AVAILABLE

Twenty years experience as instructor and supervisor of industrial education on the secondary level. Ten years experience as director of a community adult education program. Extensive war experience as administrator of war production and ESMWT training in a large mid-western aircraft plant. Two and a half years as ass't. chief of Education and Training, Veterans Admin. Branch office with supervision over job and institutional training in four states. Wide professional contacts, author. B.S. and M.A. degrees. 45 years of age. Free to travel. Will consider sales representation in substantial educational field. Write IAVE, Box 449.

THE REVOLUTIONARY NEW
BOICE-CRANE
FRICTION-MATIC WET TOOL GRINDER

$16.50 f.o.b. factory

For efficient sharpening of hand tools, plane bits, lathe tools, scrapers and knives, without danger of damage to tools or personal injury. Simplified self-adjusting friction roll drive. No countershaft or extra belt. Peripheral speed remains constant as wheel wears. No water thrown on operator. Larger size tool rest — the first with angular adjustment: ingeniously mounted above grindstone for comfortable operating position and control of pressure.

See your hardware dealer, order direct, or write for literature.

AT HARDWARE DEALERS EVERYWHERE
BOICE-CRANE COMPANY
932 CENTRAL AVENUE • TOLEDO 6, OHIO

(Continued from page 28A)

♦ PERCY H. HERON, head of the technical department, San Diego High School, and supervisor of vocational and industrial arts education, San Diego City Schools, San Diego, Calif., retired in June, 1948, after 35 years of service.

At present he is acting director of the Instituto de Artes Mecanicas, Divisa, Province of Herrera, Republic of Panama. The project is under the auspices of the Servicio Cooperativo Interamericano de Educacion working under the Institute of Inter-American Affairs. Mr. Heron has been a subscriber and contributor to the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION since Volume 1, No. 1.

♦ L. D. RALPH has been selected to assist L. S. Duke in the industrial-arts department of the Central High School, Columbia, Tenn.

Mr. Duke will retire in 1950 after having taught industrial-arts work in this community for 40 years.

Mr. Ralph, a veteran, will receive his B.S. degree from the Middle Tennessee State College, Murfreesboro, Tenn., in March, 1949.

♦ DR. WILLIAM T. SPANTON, chief Agricultural Education Service, U. S. Office of Education, and DR. CLARENCE POE, editor, publisher, and agricultural leader of Raleigh, N. C., were both honored by having honorary membership conferred on them in the Alpha Zeta Fraternity at a meeting held recently in Washington, D. C.

This fraternity is a professional organization in the field of agricultural leadership.

♦ ALVIN I. THOMAS has completed his work for the master's degree at the Kansas State Teachers College, and joined the staff of the Prairie View State University of Prairie View, Tex. He will teach general woodworking, cabinetmaking, carpentry, and professional industrial education courses.

EDWARD F. WORST DIES

Edward F. Worst died in St. Joseph Hospital, Joliet, Ill., on June 28, 1948.

Mr. Worst, 82, was injured in a fall Friday night, June 25, 1948, while returning from a high school basketball game.

He was an official of the Chicago public school system for 35 years. He retired in 1935. He was appointed the first superintendent of the Joliet public schools, and then accepted a principalship of a Chicago school in 1900. Later he was made head of the industrial-arts department of the Chicago Normal School, after which he became the director of industrial arts for Chicago for a period of 23 years.

At the time of this death he was a citizen of Lockport, Ill., and the president of the Lockport High School board.

Mr. Worst was a steady contributor to the professional literature of his field, and is the author of several nationally known books on weaving.

He is survived by two sons and a daughter.

New Publications

Klenke's Furniture Book

By William W. Klenke. Cloth, 173 pp., 6¼ by 9¼ in., illus., $3.25. The Manual Arts Press, Peoria, Ill.

A book written for the dual purpose of giving instruction on how to make furniture, and to present detailed drawings of fine pieces of furniture which the advanced student or home craftsman can make.

The book describes how to select the wood required for making a certain project, what machinery to use, how to assemble and finish the parts, and how to upholster the finished project. The book contains 44 plates of various kinds of period furniture which the reader can make.

(Continued on page 32A)

STERLING STEEL FLASKS
Assure Easy Handling

Sterling all-steel, all-welded foundry flasks combine maximum strength with minimum weight. Solid center rib and solid sand flanges at top and bottom. Full-width bearing. In style "S" flask, pin lugs and handles are combined. When closing flask, molder can guide cope over pins by feeling pins with his fingers. In many foundries, style "S" flask has replaced snap flasks. Prevents run-outs. Requires less sand.

Write for new Catalog No. 59, describing the complete line of Sterling Foundry Equipment.

Sterling FOUNDRY FLASKS
STERLING WHEELBARROW COMPANY MILWAUKEE 14, WIS. U.S.A.

THE FIRST TOOL OF THIS KIND — TODAY'S FINEST

Start a project for pleasure or profit. Make ship, plane and train models, delicate, internally carved costume jewelry, wooden statuettes, bookends, etc. Handee is the ideal tool for hobbyist, repairman, mechanic — novice or expert. It gives you smooth, steady power right at your fingertips, responds easily to your direction. Handee works on wood, plastic, metal, alloy, glass, leather, horn, stone, bone, linoleum. AC or DC. Wt. 12 oz. 25,000 r.p.m.

HANDEE KIT

A strong steel carrying case holds the Handee and 40 most popular accessories. Complete, $27.50. Handee only, with 7 accessories, $20.50. Get it at stores everywhere. If they can't supply you we'll send it postpaid.

Free 52-page Manual on request.

CHICAGO WHEEL & MFG. CO.
1101 Monroe St. Dept. IA Chicago 7, Ill.

CORNELL UNIVERSITY

1949 Summer Session

July 5—August 13

PROGRAM IN

VOCATIONAL INDUSTRIAL EDUCATION
INDUSTRIAL ARTS EDUCATION
TECHNICAL EDUCATION

•

Related Courses in Industrial and Labor Relations, Guidance and Personnel, Administration and Supervision, and Special Institutes

•

Faculty of National and State Leaders
Visiting Lecturers

•

For Summer Session Announcement write to:

Director of Summer Session

Cornell University

Ithaca, New York

KNOWLEDGE IS MORE THAN EQUIVALENT TO FORCE

MINNESOTA SUMMER SESSION

INDUSTRIAL EDUCATION

Two Terms: June 13—July 22, and July 25—August 27

Interested persons may earn a maximum of nine quarter credits per term. The offering will include both manipulative and professional courses, representative of industrial arts, federally-aided vocational-industrial education and vocational guidance. New offices, shops and classrooms will add to the convenience and efficiency of students. Library facilities and recreational programs are unexcelled.

FOR FURTHER INFORMATION WRITE:

To Dean of the Summer Session, 906 Administration Building, for Summer Session Bulletin containing general information and course schedules; for details of degree requirements for B. S. or M. A. (four plans) and Ph. D.; or for Graduate School Bulletin and "Application for Admission" blank, if not filed earlier.

UNIVERSITY OF MINNESOTA

MINNEAPOLIS 14, MINNESOTA

THE STOUT INSTITUTE

Menomonie, Wisconsin

1949 Summer Session

June 20—July 29

Six Weeks

Graduate and Undergraduate Courses

Wide range of courses in Industrial Arts, Trade and Industrial Education, Home Economics, Institution Management, and Related Art.

Special opportunities for studies in planning and equipping for home economics in newly equipped laboratories.

Demonstration industrial shops on comprehensive, general unit, and unit basis.

Liberal arts courses, Educational Techniques, and Educational Workshops.

•

• Nationally known conference leaders
• Timely courses and conferences
• Excellent teaching staff, modern facilities
• Varied recreational opportunities
• Adequate housing

•

SUMMMER SESSION BULLETIN SENT ON REQUEST

Director of Summer Session

The Stout Institute • Menomonie, Wisconsin

BRADLEY UNIVERSITY
1949 SUMMER SESSION

TWO 30-DAY TERMS

June 15 to July 21 • July 22 to August 25

• Well balanced technical and professional course offerings leading to the Bachelor's and Master's Degrees in Industrial Education.

• Technical courses pertaining to industry.

• Resident faculty supplemented by several nationally known guest professors.

For more information or bulletins write:

DIRECTOR OF THE SUMMER SESSION

BRADLEY UNIVERSITY

PEORIA 5, ILLINOIS

"How many times have shop pupils asked about repairing their bikes?"

YOUR BICYCLE

BY KRAYNICK

Only $1.25

THE MANUAL ARTS PRESS

878 Durac Bldg.
Peoria 3, Illinois

The *Newsmagazine* of the New Jersey Vocational and Arts Association in a recent issue says:

"We asked a bicycle man to look over this novel guide on bike repairing. He wondered why one hadn't been published long ago. How many times have shop pupils asked about repairing their bikes? Here is a simple, practical book to help them. The book is well illustrated and contains all the information necessary to understand and care for bicycles."

METAL CRAFTS

Tools, Materials and Supplies

Send 50c for our new catalog IA. Payment credited on first $3.00 order.

METAL CRAFTS SUPPLY COMPANY

10 Thomas Street Providence, Rhode Island

WANTED

● A manufacturer of visual aids equipment used to teach design, construction, and operation of electric motors and generators is preparing a text book-manual written around its equipment and wishes to arrange for full time collaboration of an experienced electric shop instructor thoroughly familiar with instruction in this field through the summer months on an attractive financial basis.

CONTACT MR. L. R. CROW,
UNIVERSAL SCIENTIFIC COMPANY, INC.,
1102 Shelby Street, Vincennes, Indiana

Advise teaching experience, educational background and literary experience.

★ LEATHER BELTS, HANDBAGS, ETC. for gifts, profits, prizes
IT'S EASY
IT'S FASCINATING

Portfolio of 10 *New* Handbag Patterns, full size, easy to follow instructions for transferring tooling, etc. No. 332 only $1.50.

47 *New* Western and Novelty Belt Designs. Set No. 397 only 75 cents. *65 page idea catalog sent with first order. Write today.*

Leathercraft Headquarters for 31 Years

OSBORN BROS.
223 W. Jackson Blvd. Chicago 6, Illinois

(Continued from page 30A)

Self Designing Monogram-Alphabets

By Louis J. Haas. Paper cover, 9 pp., 7 by 9¾ in., illus., $1. Published by Louis J. Haas, 3 Gedney Terrace, White Plains, N. Y.

A book containing numerous easily reproduced alphabets, with concise directions how to combine them into interesting monograms.

Mathematics at Work

By Holbrook L. Horton. Cloth, 728 pp., 6 by 9 in., illus., $6. The Industrial Press, 148 Lafayette St., New York 13, N. Y.

This is an encyclopedic manual for draftsmen and designers of tools and machinery, and presents the basic principles of arithmetic, algebra, geometry, trigonometry, and logarithms.

It contains numerous mechanical problems taken from actual practice, and shows how they may be analyzed and solved in step-by-step procedure.

The book also contains a chapter on refresher questions in mathematics, mechanics, and strength of materials, and 145 pages of mathematics tables of various kinds.

F. M. Transmission and Reception

By John F. Rider and Seymour D. Uslan. Cloth, 409 pp., 5¾ by 8½ in., illus. John F. Rider Publisher, Inc., 404 Fourth Ave., New York 16, N. Y.

This book presents the basic principles of operations underlying the operation of F.M. transmitters and receivers.

The nine chapters of the book explain the fundamental considerations, frequency modulation, transmitters, transmission of F.M. signals, receiving antennas, F.M. receivers, alignment of F.M. receivers, and servicing F.M. receivers.

The appendix contains a reactance tube chart, and explains vectors, how to use the powers of ten, the FreModyne circuit, the F.M. ground wave signal range, and the I.F. response curves.

Electricians' Pocket Companion

By Benjamin Goldberg. Cloth, 442 pp., 5⅛ by 7⅝ in., illus., $2.50. Murray Hill Books, Inc., 232 Madison Ave., New York, N. Y.

A handy volume for the learner as well as the mechanic in the electrical field.

It contains a wealth of information, directions, and tables on bell circuits, heating system controls, lighting circuits, meters, a.c. motors, starters, telephone circuits, and transformer connections.

The book contains many diagrams and illustrations.

News Notes

♦ National Boys and Girls Week will be observed in the United States and Canada from April 30 to May 7, 1949. The celebration will mark the 29th annual observance of this important youth event.

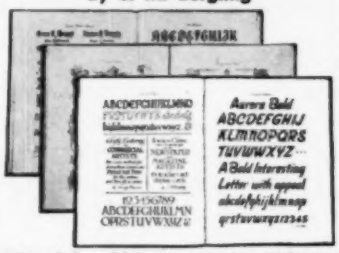
With the theme, "Building for Citizenship," the program is designed to focus the attention of the public on the interests, activities, and problems of youth. It calls attention to the organizations and programs serving their needs, and seeks to arouse the interest of the entire community in supporting measures to strengthen and insure the wholesome, purposeful development of all boys and girls. The suggested daily programs for the week include:

Citizenship Day — Saturday, April 30
Day in Churches — Sunday, May 1
Day in Schools — Monday, May 2
Health and Safety Day — Tuesday, May 3
United Nations Day — Wednesday, May 4
Careers Day — Thursday, May 5
Family Day — Friday, May 6
Day of Recreation — Saturday, May 7

Information about Boys and Girls Week, and helpful suggestions for carrying out the program

(Continued on page 34A)

TECHNICAL ART BOOKS
By J. M. Bergling



● New Deluxe Editions on Lettering, Alphabets, Monograms, Ornamental Design, Decoration, and Heraldry for the Engraver, Craftsman, Commercial Artist and Vocational Student.

V. C. BERGLING
P.O. Box 523 — MI Coral Gables, Fla.

WANT GOOD SERVICE?
When in a rush, send your order to us. 27 years of good materials.
OUR NEW CATALOGUE NOW READY
INDIANHEAD ARCHERY MFG. CO.
BOX 303-BP LIMA, OHIO
Extra prompt service

MAKE YOUR OWN
VAPOR-TYPE PAINT BRUSH CONDITIONER IN THE SCHOOL SHOP
● The only satisfactory brush keeper yet devised.
Write for complete information.
WISCONSIN LABORATORIES, INC.
2138A N. 3rd St. Dept. IA. Milwaukee 12, Wis.

FREE CATALOG

New 1949 Edition — 84 pages of craft materials and hand power tools, plastics (sheet and liquid), ceramic supplies, drawing and painting materials, foam rubber, plan sheets, woodworking projects, etc. Complete selection of the latest and best instruction books. Big assortment of kits.

Write for free copy today.

JACKSON Dept. 97
5440 N. Shoreland Ave. ● Milwaukee 11, Wis.

Amazing New
WOOD-TURNING TOOLS
sharpen once in 12-years!
(under normal use)

THESE remarkable tools tipped with TUNGSTEN CARBIDE will compete with their performance. They work FREE HAND equally well in wood, plastic or soft metals—and at the same time hold their exact-like edge almost indefinitely. Tests show that they will turn wood or plastic for days and days CONTINUOUSLY without showing any signs of dulling. They are the finest tools available at any price. Beautifully finished 5" blade—flash ground, polished tip—finest brass tube ferrule—6" hardwood handle—over all length 14"—10 tools to choose from: round and square nose from ⅛" to ½"—also cut off tool and a 3/8" skew.

Available in the following Sizes.					
Square Nose			Round Nose		
7-21	1/8"	$3.25	7-25	1/8"	$3.50
7-22	1/4"	3.50	7-26	1/4"	3.75
7-23	3/8"	3.75	7-27	3/8"	4.00
7-24	1/2"	4.00	7-28	1/2"	4.25
740 1/8" Cut off 3.50			7-41	1/2"x30° Skew	4.00

Send check or money order now. You must be delighted, or money back! Free Literature.

JOHNS MFG. CORP.
Dept. L-4 Dunellen, N. J.

There is no substitute for Quality

• For best classroom results, make sure the Drafting Supplies and Artist Materials you use bear the well-known WEBER Trade-mark . . . . .

WEBER

Trade Mark Reg. U. S. Pat. Off.

Artist and Drawing Materials

CAT. VOL. 700 TO TEACHERS AND SCHOOLS ON REQUEST

MECHANICAL DRAWING SUPPLIES		ART AND COMMERCIAL ART MATERIALS	
Drawing Instruments	Curves	Tempera	Brushes
T-Squares	Scales	Show Card Colors	Linol Block Printing Inks and Materials
Triangles	Slide Rules	Malfa Oil and Water Colors	School and Drafting Room Furniture
Drawing Boards	Protractors	Waterproof Drawing Inks	
Drawing Tables			

Patronize Your Nearest Weber Dealer

F. WEBER CO.

PHILADELPHIA 23, PA.

St. Louis 1, Mo. Baltimore 1, Md.

TEXAS A. & M. COLLEGE

1949 SUMMER SESSIONS

First 6 Weeks • June 6 — July 16
Second 6 Weeks • July 18 — August 27

B.S., M.S., and M.Ed. Degrees
in
Industrial Arts Education
Vocational Industrial Education

Summer faculty supplemented by Specialist in Industrial Arts, U. S. Office of Education and Other Visiting Professors.

Outstanding Shop Facilities

Address correspondence to:
Industrial Education Department

Texas A. & M. College
College Station, Texas
NEAR TEXAS GULF COAST

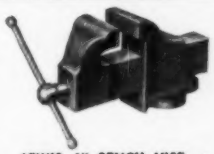
low cost
LEWIS PROJECTS

Ready-to-Machine Castings
for the Shop Student

Every boy likes tools — especially if he builds his own for his own shop. Start your students today with simple Lewis Projects, costing only a few dollars. These castings finish up with a minimum of skill and time, yet prove ideal for instruction purposes, student experience and practical use.

FREE CATALOG UPON REQUEST.

LEWIS MACHINE TOOL CO.
P.O. Box 7446, Sta. L, Dept. X
LOS ANGELES 23, CALIF.



LEWIS 4" BENCH VISE
Jaw faces: 4" x 1¼", 5" opening

LEWIS 2¾" DRILL VISE
Jaw faces: 2¾" x 1¾",
3¾" opening

CLAMPS

"Jorgensen" TRADE MARK REG U S PAT OFF

Genuine "JORGENSEN" Handscrews are the ones which will withstand "school shop service." To avoid future disappointment, be sure you ask for and get the genuine "JORGENSEN" every time.

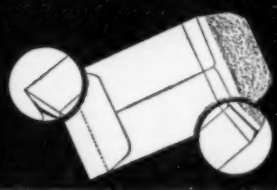
They cost no more than any others.

Ask for them by name.

Write for No. 17 General Clamp Catalog

ADJUSTABLE CLAMP CO.
"The Clamp Folks"
424 N. Ashland Ave., CHICAGO 22, ILL.

Know your envelopes . . .



For packaging or payroll!

MANY packaging problems have been solved . . . satisfactorily and economically . . . by using one of the many coin envelope sizes. (Size range: 1 7/8 x 2¾ to 3½ x 6½.)

These useful containers have enveloped a myriad of items from small nuts to lamp cord holders. Various treatments of this type of envelope transforms it into a very inexpensive but necessary and safe container, for mailing, shipping, or handing out small items that are likely to be over-looked.

A special "safety-fold" treatment makes an ordinary coin envelope into a sift-proof, solid package body at a nominal expense. This type of container enjoys great popularity with seed or powder men that have free flowing materials to package.

The coin envelope has also found itself in many plants that pay by cash. The sizes can accommodate printed forms for deductions, etc., and provide ample security and protection to the contents.

REMEMBER THE COIN ENVELOPE AND ITS "SAFETY-FOLD" FEATURE FOR PROFITABLE PACKAGING.

WESTERN STATES Envelope Company
1616 WEST PIERCE ST. MILWAUKEE 4, WISCONSIN

HARDWOOD LUMBER and PLYWOOD

•

GLUES, PLASTICS, VENEERS, ABRASIVES, DOWELS

•

LET US QUOTE

on your next year's requirements large stocks all species kiln dried carloads, truckloads, or LCL lots Plywoods, Plastics, Glues, Finishes let us quote on all your requirements

AMERICAN HARDWOOD CO.

Chas. C. Campbell, President. 25 years experience in teaching and supplying teachers.

TULSA, OKLAHOMA

Attention Schools Owning Surplus Fighter Aircraft or Bomber Aircraft or Engines

If you no longer have use for those aircraft and they are in approximately the same condition as when you acquired them, write for information as to how you may dispose of them at a profit to your school.

PALM SPRINGS AIRPORT CORPORATION
SCHOOL of AERONAUTICS
Box WW Palm Springs, California

PLASTICS

LUCITE-CATALIN
PLEXIGLAS

Jewelry Findings— Project Kits

SEND FOR NEW CATALOGUE

PLASTIC CRAFT WORKSHOP
P.O.Box 127P Rahway, N. J.

KNOCKDOWN CEDAR CHEST

Write for Free Price List Today
GILES & KENDALL CO., Huntsville, Ala.

(Continued from page 32A)

of the week, including a poster and a Manual of Suggestions, may be obtained free of charge from National Boys and Girls Week Committee, 35 E. Wacker Drive — Room 950, Chicago 1, Ill.

♦ Devo B. Fox, director of the division of vocational and practical arts education, Western Michigan College of Education, Kalamazoo, Mich., has published two pamphlets: "Industrial Arts Teaching — An Occupation With a Future," and a catalog describing the business studies, distributive education, home economics, terminal homemaking, dietitians curriculum, industrial-arts education, vocational industrial teacher education, graduate work in industrial education, pulp and paper technology, aviation, pilot training, vocational technical education, terminal courses for airline hostesses, aircraft mechanics, air conditioning and refrigeration, drafting, Linotyping, machine shop, radio, sheet metal, and auto mechanics.

♦ Handy and Harman, 82 Fulton St., New York 7, N. Y., is offering another national silversmithing workshop. Since only 12 teachers of jewelry or metalwork can be accommodated, it is best to write to the firm at once for information and membership application.

♦ Six new film strips on transportation methods for social studies classes are now available from the Audio-Visual Division of Popular Science Publishing Co., 353 Fourth Avenue, New York 10. The six, comprising a unified story of transportation's history and present-day developments, are grouped under the title, "Transportation Around the World." They are in black and white and average fifty frames each.

♦ The State Teachers College in Buffalo, N. Y., is erecting a large college union which is flanked by two dormitories. It will be completed approximately in one year. At present dormitory facilities consist of temporary buildings.

♦ A new series of six sound slide films, entitled "Human Factors in Safety," has been released by the National Safety Council.

The 35mm., 33 1/3 r.p.m. films comprise a visual training course that deals with production and job attitudes, as well as safety.

The cartoon technique is used in two of the films, and action shots of workers on the job add realism to the plant scenes.

For further information write the National Safety Council, 20 North Wacker Drive, Chicago 6, Ill.

♦ "The Easier Way," a two-reel 16mm. (twenty-one minute) sound motion picture has been produced by The Jam Handy Organization, and is now available for showings to interested groups in industry without charge. The purpose of this film is to show that motion study of production operations usually makes the workman's job easier. For details, write to James Craig, Film Section, Department of Public Relations, General Motors Corporation, 9-252 General Motors Building, Detroit 2, Mich.

AIRPLANE MECHANIC

A brief outline of the work of the airplane mechanic, what he does, and how he qualifies to do it, is now available from Occupational Index, Inc., New York University, New York 3, N. Y., for 50 cents cash with order.

AMACO

OVER 25 YEARS OF SERVICE TO SCHOOLS AND HOBBYISTS

POTTERY SUPPLIES AND EQUIPMENT

KILNS • CLAYS • GLAZES • WHEELS

Write for Pottery Catalog
AMERICAN ART CLAY CO., Indianapolis, Ind.

BALSA

MILL END BLOCKS

Priced below actual factory cost

★

WRITE FOR PRICES AND FULL DETAILS
TESTOR CHEMICAL COMPANY
(WOODWORKING DIV.) ROCKFORD, ILLINOIS

PAXTON

Specialists In
INDUSTRIAL ARTS
LUMBER & PLYWOOD

FRANK PAXTON LUMBER CO.

Des Moines • Fort Worth • Chicago
Kansas City • Denver

LUMBER FOR SCHOOLS

T. A. FOLEY LUMBER CO.
PARIS, ILL.

ELECTRIC KILNS

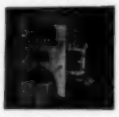
LONG LIFE • RIBBON TYPE HEATING ELEMENTS • ANY SIZE
2000 F° to 2200 F° — Quick Delivery

JAMES W. WELDON
Laboratory
2315 Harrison St. Kansas City 8, Mo.

Heat Treating Furnaces and Equipment

FORGES—gas fired, no smoke or dirt. Sizes from the bench type at right to large floor models.

MELTERS—for aluminum, brass, lead, gold, etc., many sizes and types.



We also supply Ovens, Salt Baths, Complete Shop Tables — Blowpipes, Burners Etc.

American Gas Furnace Co.
Elizabeth, N. J.

Electro-Typers

Especially qualified to be of service to the school printshop.

Promptness and quality assured.

Forms returned same day received.

Badger - American Electrotype Co.
660 Montgomery Bldg.
407 East Michigan St., Milwaukee, Wis.

FLEXO Bending Jig

Make Scrolls, Circles, Curves for all kinds of metal projects with this amazing tool. Flexo Bending Jig bends any kind of metal from 1/16" thick to ½" square without heating.

Flexo Jig has hundreds of uses. Makes floor lamps, pin-up brackets, signs, flower holders, etc. Forms graceful curves; works fast; requires no heat; turns out expensive looking metal scrollwork for home projects, gifts, and salable products. Saves you money. Pays for itself in one evening.

Excellent for home shops, schools, sign shops. Flexo Jig is precision built and guaranteed. Costs only $7.50. Sent complete, postpaid, ready to use. Order yours today!

C & W TOOL COMPANY
19 Chestnut Street Cambridge, Mass.

LOOMS, Table and Foot
Reed, Raphia, Handicraft Supplies
Send for catalog
J. L. HAMMETT CO.
CAMBRIDGE, MASS.

Sta-Warm

AUTOMATIC GLUE POTS

- Best for industrial arts. Temperature control is automatic — just plug into the wall outlet.
- No danger of burning the glue nor no danger of harming the pot should it be empty.

1 pint to 11 quarts
Deep or bookbinders style

STA-WARM ELECTRIC CO.—Ravenna, Ohio

TOOLS ALWAYS SHARP with PLURALITY OILSTONE TOOL GRINDERS

No. 450 Plurality Jr.

Now available in 3 sizes
No. 425 Plurality Sub Jr.
No. 450 Plurality Jr.
No. 475 Plurality

Grinding can be done on a cone, coarse or fine oilstone, leather stropping or emery wheels. Unit is compact, efficient, serviceable, easily accessible and has ball bearing direct motor drive. Especially guarded for school shop use. Details on request.

Mummert-Dixon Co. Hanover, Pa.
Originators and Pioneer Manufacturers of Oilstone Tool Grinders

ADVERTISERS' PRODUCTS AND SERVICES

Advertisers in this index are given a code number in addition to the page number on which the advertisement appears. Refer to the advertisement for product or services available. Write direct to advertisers or use the coupon in requesting information from a number of advertisers.

Code No.		Page No.
40	Adjustable Clamp Company	33A
41	Alexander-Stafford Corp.	24A
42	Aluminum Company of America	15A
43	American Art Clay Company	34A
44	American Gas Furnace	34A
45	American Hardwood Company	34A
46	American Steel Foundries, King Tool Div.	11A
47	American Technical Society	22A
48	Ames Precision Machine Works	6A
49	Ammco Tools, Inc.	9A
410	Armstrong Bros. Tool Co.	8A
411	Atkins and Company, E. C.	4A
412	Atlas Press Company, The	5A
413	Badger American Electrotype Co.	34A
414	Behr-Manning Corporation	19A
415	Bergling, V. C.	32A
416	Black & Decker Mfg. Co.	14A
417	Boice-Crane Company	30A
418	Bradley University	31A
419	Brodhead-Garrett Company	36A
420	Bruce Publishing Company	3rd cover
421	C & W Tool Company	35A
422	Chicago Wheel & Mfg. Co.	30A
423	Cincinnati Tool Company, The	4A
424	Columbian Vise & Mfg. Co.	10A
425	Cornell University	31A
426	Delmar Publishers	27A
428	Delta Mfg. Company, Division Rockwell Mfg. Co.	3A
429	Disk Company, A. B.	17A
430	Dixon Crucible Co., Joseph	25A
431	Electric Hotpack Company, Inc.	24A
432	Elliott Company, B. K.	24A
433	Erwood Co., The	2A
434	Foley Lumber Company, T. A.	34A
435	Gearon Company, The	21A
436	General Electric Company (Apparatus Division)	26A
437	Giles and Kendall Co.	34A
438	Hammett Company, J. L.	35A
439	Indianhead Archery & Mfg. Co.	32A
440	Jackson Studio	32A
441	Johns Mfg. Co.	32A
442	Kester Solder Company	23A
443	LeBlond Machine Tool Co., R. K.	4th cover
444	Lewis Machine Tool Co.	33A
445	Logan Engineering Company	7A
446	Lufkin Rule Company, The	10A
447	Manual Arts Press	32A
448	McGraw-Hill Book Co., Inc.	24A
449	Metal Crafts Supply Co.	32A
450	Metal Goods Corporation	22A
451	Millers Falls Company	28A
452	Morgan Vise Company	2A
453	Mummert-Dixon Company	35A
454	Nicholson File Company	12A
455	Oliver Machinery Co.	4A
456	Oregon State College	29A
457	Osborn Brothers	32A
458	Oswego State Teachers College	29A
459	Palm Springs Airport Corp. (School of Aeronautics)	34A
460	Parks Woodworking Machine Co.	21A
461	Paxton Lumber Co., Frank	34A
462	Pennsylvania State College	29A
463	Pittsburgh Plate Glass Co.	2nd cover
464	Plastic Craft Workshop	34A
465	Plastic Parts & Sales	21A
466	Plumb, Inc., Fayette R.	30A
467	Ruby Chemical Company	6A
468	Sheldon & Co., E. H.	20A
469	Sheldon Machine Co., Inc.	18A
470	Skilsaw, Inc.	2A
471	Snap-On Tools, Inc.	8A
472	South Bend Lathe Works	1A
473	Stanley Tools (Division of Stanley Works)	27A
474	Stanley Electric Tool (Division of Stanley Works)	36A
475	Starrett Co., The L. S.	16A
476	Sta-Warm Electric Company	35A
477	Sterling Tool Products Co.	8A
478	Sterling Wheelbarrow Co.	30A
479	Stout Institute, The	31A
480	Testor Chemical Co.	34A
481	Texas A. & M. College	33A
482	Universal Scientific Company	32A
483	University of Minnesota	31A
484	University of Southern California	29A
485	Wallace Company, J. D.	6A
486	Weber Company, F.	33A
487	Weldon Laboratory, James W.	34A
488	Western States Envelope Co.	33A
489	Williams and Co., J. H.	10A
490	Wisconsin Laboratories, Inc.	32A

USE THIS COUPON

The advertisements in this issue have been given a code number for your convenience in requesting information on products, services, booklets, and catalogs offered. Encircle the code number of the advertisement in which you are interested, clip and mail the coupon to INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. Your request will receive prompt attention. BRUCE—MILWAUKEE.

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION 1949
540 North Milwaukee St., Milwaukee 1, Wis.

Please send information offered in the advertisements we have encircled.

40	410	420	430	440	450	460	470	480
41	411	421	431	441	451	461	471	481
42	412	422	432	442	452	462	472	482
43	413	423	433	443	453	463	473	483
44	414	324	434	444	454	464	474	484
45	415	425	435	445	455	465	475	485
46	416	426	436	446	456	466	476	486
47	417	427	437	447	457	467	477	487
48	418	428	438	448	458	468	478	488
49	419	429	439	449	459	469	479	489
								490

Also information on .....

Name .....
Please Print

Title ..... School .....

City ..... Zone ..... State .....

help students
KEEP THEIR EYES ON THE WORK
•
KEEP THE WORK OUT OF THEIR EYES

Stanley "FLUD-LITE" Eye Shields

Help your students do better work by helping them to see better. "Flud-Lite" Eye Shields give 30% more visibility . . . concentrated, even illumination from two lamps with reflectors. Protects your students' eyes with 4" x 6" full glass shielding . . . replaceable ordinary glass under safety glass. Easily adjustable up or down and to any angle to suit user's position and convenience. But cannot be moved off "on guard" position without dismantling. Can be wired to motor circuit so that light is on only when grinder is on. Easily removed bayonet type lamps with supported filament. Fits all grinders, bench and belt-driven. Available for 115 or 220 volts. Write for illustrated folder. Stanley Electric Tools, Educational Dept., 482 Myrtle St., New Britain, Conn.

THE GREATEST NAME IN TOOLS
STANLEY
Reg. U. S. Pat. Off.
HARDWARE • HAND TOOLS • ELECTRIC TOOLS • STEEL STRAPPING

TOPS the Country Over
these much-in-demand B-G Exclusives!

G-1 Single Woodworking Bench
2¼" Maple Top

Nothing like it anywhere in open frame benches for ideally answering the students' needs in size, construction and equipment. Frames are extra heavy material, with Linderman joints; girts full 5" wide.

SPECIFICATIONS

	Length	Width	Depth	Height
Table	52"	22"	. .	32"
Drawer	30"	. .	19"	6"

Made of birch and maple, shellaced. Equipped with one No. 5CD Columbian Vise, one Quick-Set Bench Stop, one Metal Dog. Weight 150 lbs. Complete, shipped knocked down. Order No. G-1, only **$55**

L-4 Locker Type Woodworking Bench
2¼" Maple Top

Conserves floor space, speeds up projects. Sturdy 54" x 64" reinforced all-maple top, with four 5CD Columbian Vises, one at each corner—mounted on 12 sturdily constructed 20 gauge olive green enameled steel lockers. Height 32¼". Complete, shipped knocked down. Order No. L-4. **$220**

All-Steel Drawing Table

Large 45½" x 26" top surface. Here is efficiency plus—design under supervision of practical school authorities. Large 45½" x 26" top surface mounted on four numbered students lockers, each 32⅞" x 24" x 4½", containing space for 26½" drawing board, top shelf for instruments. Finished in brown enamel. **$75**

BRODHEAD GARRETT CO.
"Everything in Industrial Art Supplies"
4560 E. 71st ST. CLEVELAND 5, OHIO

AUTO MECHANICS

By Ray F. Kuns

Based on the author's widely accepted Automotive Essentials and Automotive Service. Each volume covers a separate unit.

Course 1.
The Engine

Course 2.
Cooling, Lubrication, and Fuel Systems

Course 3.
Automotive Electricity

Course 4.
The Power Flow

Course 5.
Chassis Units

Paper, $1.25 each unit

METALWORK ESSENTIALS

By Tustison and Kranzusch

A basic text for beginning courses in metalwork, covering the essential processes, basic information, and elementary experiences selected from the whole range of bench metalwork. Organized in terms of 33 "basic units" of instruction. Profusely illustrated.

Cloth, 176 pages, $2.00

SHOP MATHEMATICS

By C. A. Felker

Includes the basic shop mathematics for the so-called mechanical trades.

Cloth, 392 pages, $2.72

APPLIED MATHEMATICS

By James F. Johnson

Planned for the great percentage of boys who leave high school for the industries, either before or after graduation

Cloth, 442 pages, $1.76

FUNDAMENTALS OF APPLIED ELECTRICITY

By E. W. Jones

An excellent textbook and shop manual covering the fundamentals of electricity and magnetism, both theoretically and practically, in complete modern, up-to-date form. Especially designed for beginning classes.

Cloth, 384 pages, $2.60

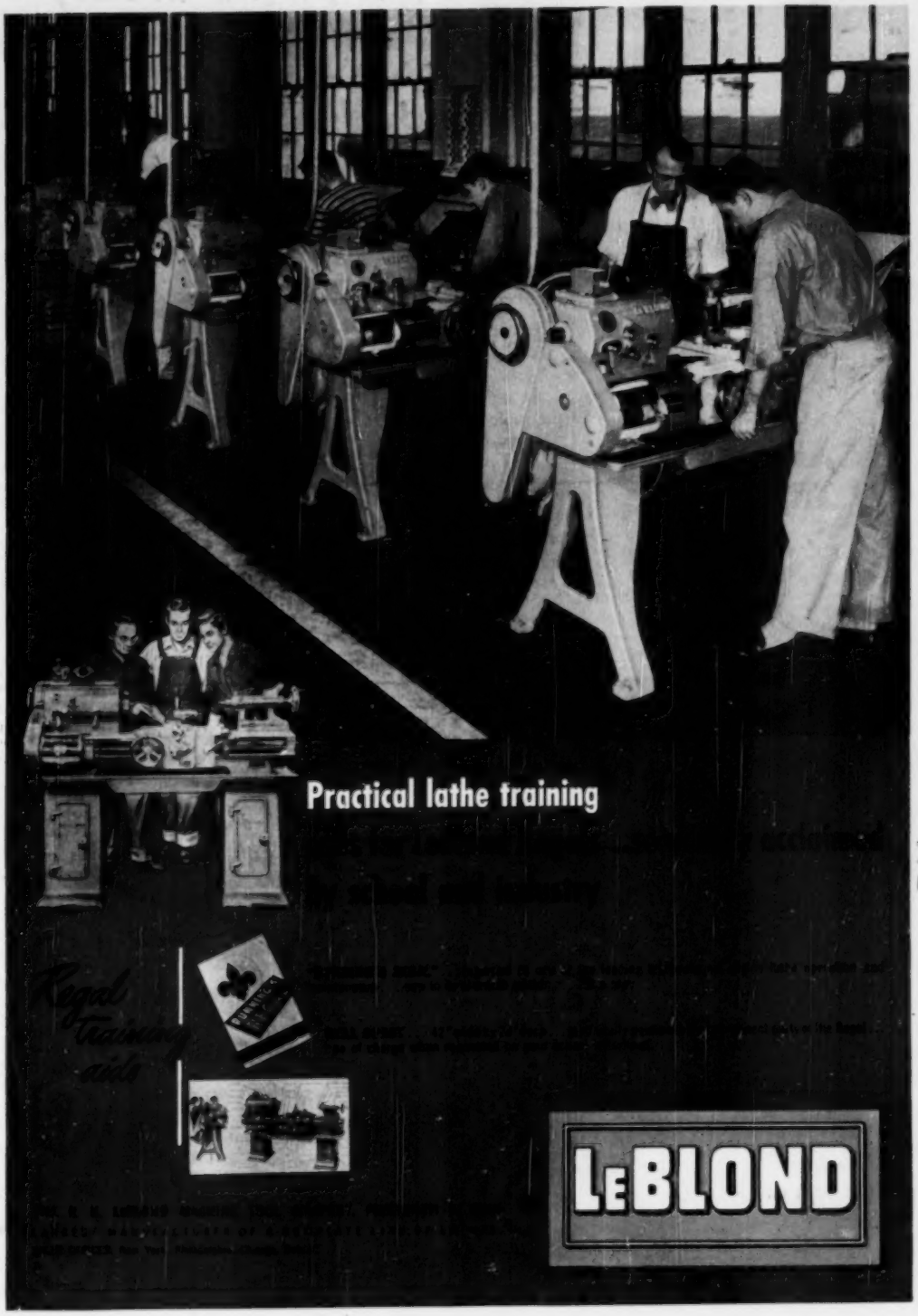
PRACTICAL ELECTRICITY

By John Edmund Crawford

For use in vocational and industrial schools by boys who have not studied electricity before and whose mathematical training has not gone beyond arithmetic, this text sets forth the principles of electricity in the clearest and most practical manner possible.

Cloth, 288 pages, $1.96

Examination copies sent for a 30 day study period — no obligation.


Practical lathe training
Regal Training Aids
LEBLOND